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ACCB

Owner's Guide

Sine Wave Plus AC Conduit Box (ACCB) Owner's Guide

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Sine Wave Plus AC Conduit Box (ACCB)

Installation Guide

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About This Guide

Purpose

The purpose of this **Installation Guide** is to provide explanations and procedures for installing and operating the **Sine Wave Plus AC Conduit Box (ACCB)**.

Scope

The **Sine Wave Plus AC Conduit Box (ACCB) Installation Guide** provides safety guidelines and procedures for installing and operating the **ACCB**.

Audience

This **Guide** is intended for those who need to install and operate the **Sine Wave Plus AC Conduit Box**. Only skilled personnel, such as certified electricians and solar technicians should attempt installation of this equipment. Skills required include the ability to read and understand how to follow single line wiring diagrams.

Organization

This **Guide** is organized into two chapters.

Chapter 1, “Installation” provides installation and wiring instructions for the Sine Wave Plus AC Conduit Box (ACCB).

Chapter 2, “Operating the ACCB” describes the different modes and operation of the Bypass Switch on the ACCB.

Warranty and product information is provided at the end of the guide.

Conventions Used

The following conventions are used in this guide.



WARNING

Warnings identify conditions that could result in personal injury or loss of life.



CAUTION

Cautions identify conditions or practices that could result in damage to the unit or other equipment.

Important: These notes describe things which are important for you to know, but not as serious as a caution or warning.

Abbreviations and Acronyms

AC	Alternating Current
ACCB	AC Conduit Box
ALM	Auxiliary Load Module
ASC	Authorized Service Center
AWG	American Wire Gauge
DC	Direct Current
EPO	Emergency Power Off
GSM	Generator Start Module
ICA	Inverter Communications Adapter
ICM	Inverter Control Module
ISC-S	Inverter Stacking Control – Series
RMA	Return Material Authorization
SP-1	Safety Plate
SEMS Screw	Screw with a captive lockwasher

Related Information

You can find more information about Xantrex Technology Inc. as well as its products and services at **www.xantrex.com**

Important Safety Instructions



WARNING

This chapter contains important safety and operating instructions for **Sine Wave Plus AC Conduit Boxes (ACCB)**. Read and keep this **Sine Wave Plus AC Conduit Box (ACCB) Installation Guide** for future reference.

1. Before installing the **ACCB**, read all instructions and cautionary markings on the **ACCB** and all appropriate sections of this guide.
2. Do not expose the **ACCB** to rain, snow, or spray. To reduce risk of fire hazard, do not cover or obstruct the ventilation openings. Do not install the **ACCB** in a zero-clearance compartment. Overheating may result. Minimum clearance for ventilation around the unit must be six inches at the end and three inches top and bottom.
3. Use only attachments recommended or sold by the manufacturer. Doing otherwise may result in a risk of fire, electric shock, or injury to persons.
4. The **ACCB** is designed to be permanently connected to your inverter. It can be mounted on a vertical surface (or wall) or on a shelf. Xantrex recommends that all wiring be done by a certified technician or electrician to ensure adherence to the local and national electrical codes applicable in your application.
5. To avoid a risk of fire and electric shock, make sure that existing wiring is in good condition and that wire is not undersized. Do not operate the **ACCB**, or inverter, with damaged or substandard wiring.
6. Do not install the **ACCB** if it has received a sharp blow, been dropped, or otherwise damaged in any way. If the unit is damaged, see the Warranty section at the end of this guide.
7. To reduce the risk of electrical shock, disconnect all power to the **ACCB** and the Sine Wave Plus Inverter/Charger before attempting any maintenance or cleaning or working on the **ACCB**.
8. The **ACCB** is provided with an equipment-grounding conductor which must be connected to the inverter/system equipment ground.

Explosive gas precautions

1. Working in the vicinity of lead-acid batteries is dangerous. Batteries generate explosive gases during normal operation. Therefore, you must read this guide and follow the instructions exactly before installing the **ACCB**.
2. To reduce the risk of battery explosion, follow these instructions and those published by the battery manufacturer and the manufacturer of the equipment in which the battery is installed.

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Installation

Chapter 1, “Installation” provides installation and wiring instructions for the **Sine Wave Plus AC Conduit Box (ACCB)**.

The following topics are covered in this chapter.

For this topic:	See:
“Introduction”	page 1–2
“Specifications”	page 1–3
“Bypass Switch Assembly”	page 1–4
“Code Compliance”	page 1–5
“Installation Tools and Materials”	page 1–5
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“Off-Grid Wiring”	page 1–18 through page 1–29
“On-Grid Wiring”	page 1–30 through page 1–37
“Wiring for Dual Inverter Configurations”	page 1–39

Introduction

The **ACCB** connects to the AC side of a **Sine Wave Plus** inverter and accepts AC conduit runs. It protects the cable connections to the inverter and provides an inverter bypass (for a single AC source) and AC disconnect breakers.

Additional circuit breakers may be added to the **ACCB**. Use Square D, Type QOU, DIN rail mounted breakers which can be readily purchased from most electrical suppliers.

Square D filler plates (QOFP) may be used to refill a knockout panel if the knockout is no longer used or removed in error.

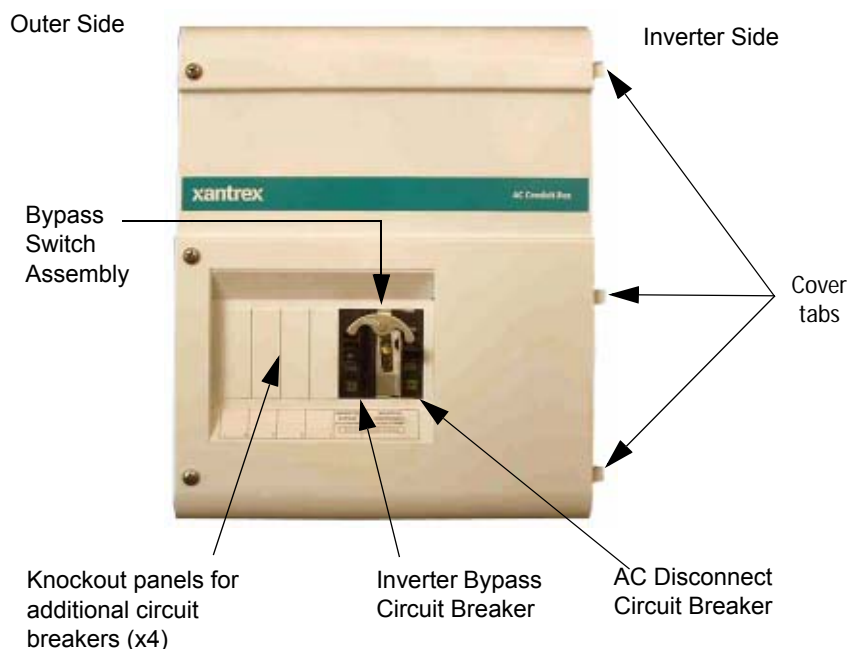


Figure 1-1 AC Conduit Box, Front View

The **ACCB** comes pre-wired for connection to a **Sine Wave Plus** inverter; You must provide wires for connection from the AC distribution panel and from a generator and/or utility to the **ACCB**. This guide provides instructions for installing additional circuit breakers into the **ACCB** and for connecting the **ACCB** to the inverter and other system components (i.e., utility panel, AC distribution panel, grounding, and generator).

Important: Before installing the **ACCB**, read all instructions and cautionary markings located in this guide and in your inverter manual.

Specifications

Dimensions	15 1/8" (H) x 10 3/4" (W) x 8 7/8" (D) (384 mm x 273 mm x 225 mm)
Weight	12 pounds (5 kg)
Shipping Weight	15 pounds (7 kg)
Operating Voltage	120 Vac
Breakers:	
Bypass	60 Amp (SPST)
Inverter Input/Output	60 Amp (DPST)
Operating Temperature	-10 to 60 °C (14 to 140 °F)
Storage Temperature	-55 to +100 °C (-67 to 212 °F)
Enclosure	Indoor rated
Finish	Powdercoat
Color	White
Regulatory	Certified by CSA to UL 1741 and CSA 107.1-01

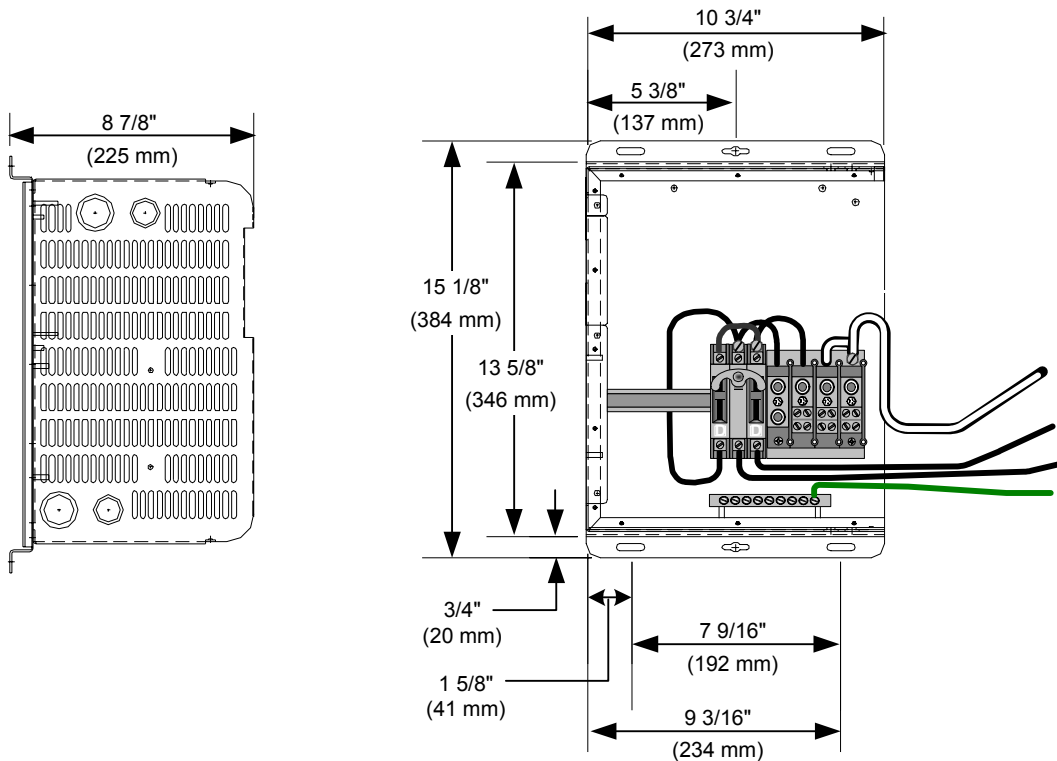


Figure 1-2 ACCB Dimensions (not to scale)

Bypass Switch Assembly

The bypass switch assembly in the **ACCB** is designed for 120 Vac applications and comes with two 60-amp circuit breakers (one SPST and one DPST). The breaker pair is equipped with a lockout rocker that allows only one breaker to be ON at any given time.

The bypass switch allows the generator or grid to provide power to the inverter loads in the event that the inverter is disabled or removed for service.

For more information see [Chapter 2, “Operating the ACCB”](#), in this guide.



WARNING: Electrical Hazard

If the inverter is removed from service while the bypass is used, live circuits inside the **ACCB** will not be guarded from accidental touch. Be sure to install the Safety Plate (SP-1) to prevent accidental electrocution if the inverter is removed from the system.

Safety Plate (SP-1)

A Safety Plate (SP-1) is provided to enclose the **ACCB** to prevent accidental contact with any AC power within the **ACCB** if the inverter is ever removed from the system configuration. The safety plate is not used in the initial installation and should be stored in a convenient location.

See [page 1–40](#) for installation instructions for the Safety Plate.



Figure 1-3 Safety Plate SP-1

Code Compliance

Governing installation codes vary depending on the location and type of installation. Electrical installations must meet local and national wiring codes. Installations of this equipment should only be performed by skilled personnel such as qualified electricians and Certified Renewable Energy (RE) System Installers. For a list of Xantrex Certified RE dealers, please visit our website at www.XantrexREdealers.com.

Important: Be sure to obtain the appropriate permits, if necessary, prior to starting this installation.

Installation Tools and Materials

Tools Required

The following tools may be required for installing this equipment.

- ☐ Wire strippers
- ☐ Assorted open-end wrenches or socket wrench and fittings
- ☐ Torque wrench
- ☐ Electrical tape
- ☐ Multi meter (AC/DC volts, frequency)
- ☐ Assorted Phillips screw drivers
- ☐ 3/16" Allen/Hex head driver
- ☐ Slotted screw driver
- ☐ Level
- ☐ Pencil
- ☐ Utility knife

Hardware / Materials Required

The following materials may be required for completing this installation.

- ☐ Conduits, bushings, and appropriate fittings for wire runs
- ☐ Wire nuts
- ☐ Electrical wire of appropriate size and length
- ☐ Breaker Panels
- ☐ Ground busses, bars, and/or rods
- ☐ Six #10 wood screws or ¼ inch (6 mm) lag bolts and washers.

Wiring Scenarios

Wiring scenarios will depend upon the configuration of the overall system (i.e., Off Grid or On Grid). Pre-installation and mounting instructions apply to all configurations. Follow the instructions from [page 1–7](#) to [page 1–17](#) for all installations.

After the pre-installation procedures have been completed, select the wiring scenario that applies to your configuration. Once you have completed the wiring instructions for your specific application, proceed to the Operation section.

Off-Grid Applications

The following Off-Grid scenarios are covered in this guide:

- Off-Grid Applications using an AC distribution panel (sub-panel) and an external generator disconnect switch.
See [page 1–18](#) for wiring instructions for this application.
- Off-Grid Applications using an additional circuit breaker in the ACCB for a generator disconnect.
See [page 1–22](#) for wiring instructions for this application.
- Off-Grid Applications using additional circuit breakers in the ACCB for AC loads and a generator disconnect.
See [page 1–26](#) for wiring instructions for this application.

On-Grid Applications

The following On-Grid scenarios are covered in this guide:

- On-Grid Applications with generator backup using an AC Distribution Panel and an additional circuit breaker in the ACCB for a generator disconnect.
See [page 1–30](#) for wiring instructions for this application.
- On-Grid Applications using additional circuit breakers in the ACCB for AC distribution (i.e., no sub panel).
See [page 1–34](#) for wiring instructions for this application.

Pre-installation



WARNING

Ensure that no DC voltage is being supplied to the inverter and that no AC voltage is present on the AC wiring. Failure to do so could cause serious injury or death.

Location

Be sure to allow sufficient space for the **ACCB** to be mounted directly adjacent to the inverter's AC side. Also consider the additional weight and ventilation space requirements of the **ACCB**.

Ventilation Requirements

Minimum clearance for ventilation around **ACCB** must be at least 6 inches (152 mm) at the end and at the top. The minimum clearance is needed to prevent recirculating hot air from the inverter's exhaust (DC side) from going back into the inverter's intake (AC side).

For maximum ventilation, 12 inches (305 mm) is recommended around the top.

Please refer to the Sine Wave Plus Inverter/Charger Owner's Guide for additional location considerations.

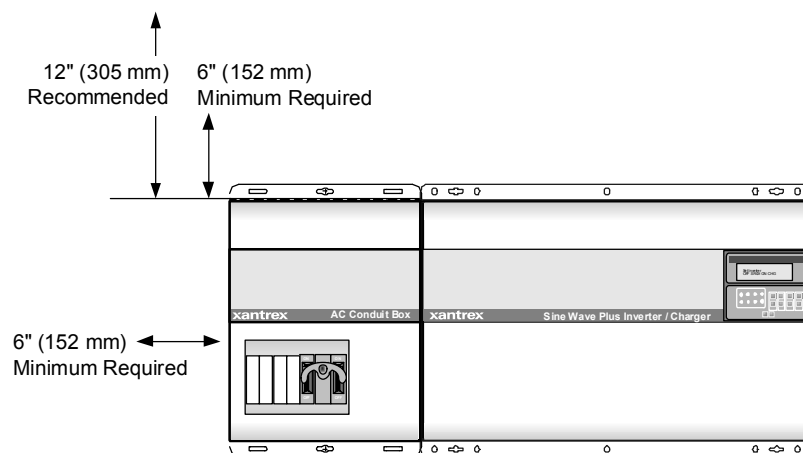


Figure 1-4 Clearance Requirements for Ventilation

Knockout Preparation

Knockout preparation should be done before mounting either the inverter or the **ACCB**.

1. Remove the appropriate knockouts from the AC side of the inverter, for cabling from the **ACCB** terminal block to the inverter terminal block. See [Figure 1-5](#) for the size and locations of the knockouts on the Sine Wave Plus Inverter Charger.
2. Remove the appropriate knockouts from the **ACCB** for wire runs from utility and/or inverter panels, a generator, and/or additional inverters. See [Figure 1-7](#) for the locations of the knockouts on the **ACCB**.
3. If additional circuit breakers are to be added to the **ACCB**, remove one knockout on the top cover for each additional circuit breaker to be installed. See [Figure 1-6](#) for the locations of the knockouts on the **ACCB** top cover.
4. Ensure that there are no metal shavings in the **ACCB** or inverter before proceeding with the rest of the installation.
5. Install bushings in knockouts provided to protect the wires from damage.

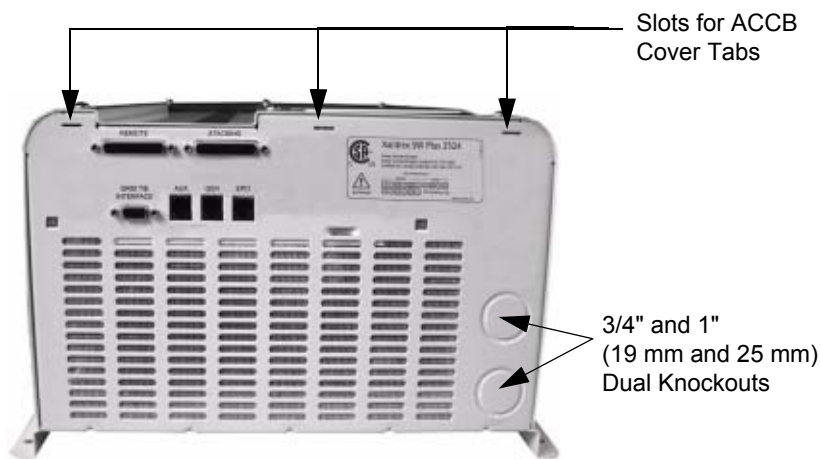


Figure 1-5 SW Plus Inverter, AC Side Showing Knockout Location

Important: If larger knockouts are required, an electrician's knockout punch may be used for larger size knockout holes if necessary.

Knockout Locations
for four additional
circuit breakers



Figure 1-6 Knockouts on ACCB Top Cover for Additional Circuit Breakers

Accessory Cable Slots

Two slots on the top and bottom of the ACCB base are provided to route the cables for the Inverter Stacking Cable - Series (ISC-S) and the remote Inverter Control Module (ICM) if used. These slots are covered by small hole plugs if these accessories are not used.

If your configuration will include the use of the ISC-S or remote ICM accessories, then determine which slot(s) will be needed and remove the hole plug(s) for that slot only. Do not remove any hole plugs from slots that will not be used.

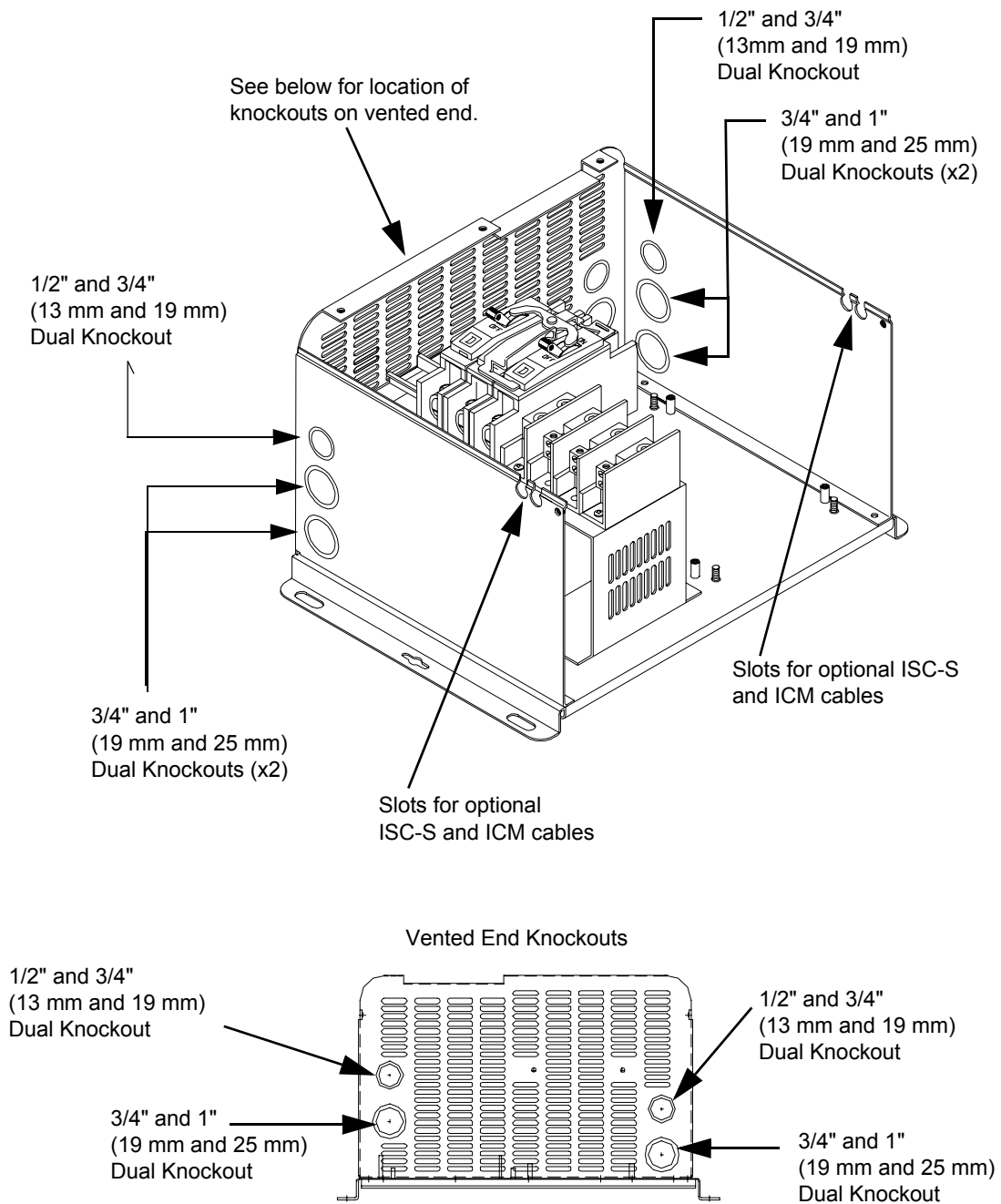


Figure 1-7 ACCB Knockout Locations

Removing and Replacing the ACCB Cover

Remove the top cover to install additional breakers and to connect the AC wiring of the inverter to the ACCB.

See [Figure 1-8](#) for the locations of screws and cover tabs.

To remove the ACCB cover:

1. Remove the three #12 Phillips screws and lock washers from the front of the cover and the two #8 Phillips head, Sems screws from the top and bottom of the cover.

Place the loose screws and washers somewhere safe where they will not be lost.

2. Lift the cover off the ACCB.

If the ACCB is already installed on the inverter, then slide the cover away from the inverter before lifting, to remove the ACCB cover tabs from the inverter slots.

To replace the ACCB cover:

1. Place the cover on top of the ACCB with the screw holes lined up.

If the ACCB is already installed on the inverter, then first insert the three cover tabs into the appropriate slots on the AC side of the inverter.

2. Replace the #12 Phillips screws and lock washers that were removed from the front and tighten into place.
3. Torque the #12 Phillips screws to 26-28 in-lbs.
4. Replace the #8 Phillips head, Sems screws from the top and bottom of the chassis.
5. Torque the #8 Phillips head, Sems screws to 19-21 in-lbs.

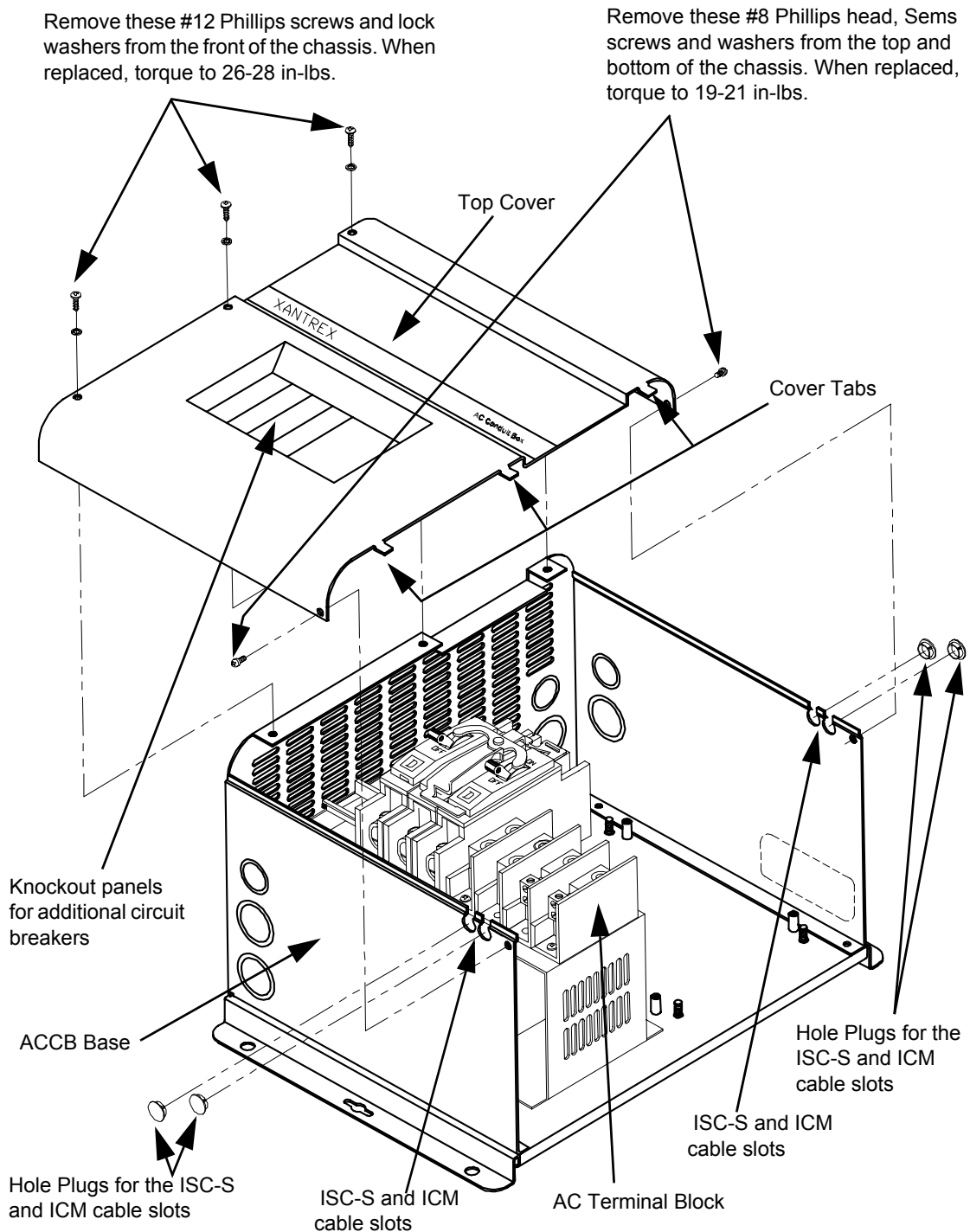


Figure 1-8 ACCB Cover Removal

Installing Additional Breakers

If additional AC circuit breakers are to be installed for specific AC loads or a generator disconnect, then install them per the manufacturer's instructions in the space to the left of the inverter bypass and AC disconnect breakers.

Note: The **ACCB** DIN-Rail accepts Square-D, Type QOU circuit breakers.

To install additional Square-D, Type QOU, circuit breakers:

1. Remove the top cover as described on [page 1-11](#).
2. Loosen the screw in the DIN Rail End Clamp and slide the clamp to the left to make room for the additional circuit breaker(s).
3. Install the circuit breaker(s) on the DIN rail to the left of the bypass switch. Be sure to align them to fit into the spaces made by the knockouts that were removed on the top cover.
4. Slide the clamp tight against the last circuit breaker on the right and tighten the screw to secure the clamp on the DIN Rail.

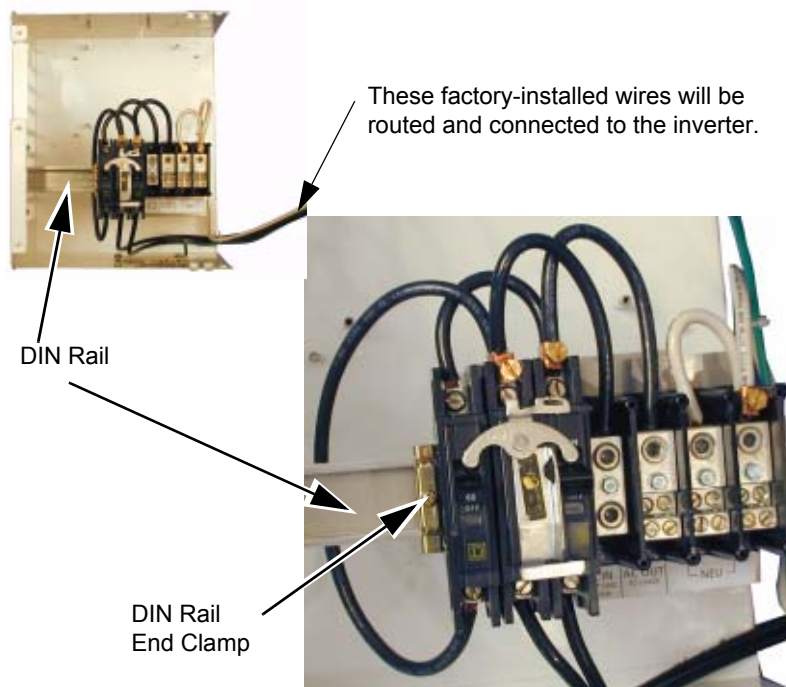


Figure 1-9 Installing Additional Breakers on the DIN rail

Mounting the ACCB to the Inverter

Important: Ensure that the factory installed cables in the ACCB are not pinched, crushed, removed, or damaged during the installation to the inverter.

To install the ACCB on the inverter:

1. Mount the inverter into place, either wall-mounted or shelf-mounted, and secure with appropriate lag bolts. See the Sine Wave Plus Inverter/Charger Owner's Manual for specific mounting instructions for the inverter.
2. Line up the ACCB at the AC end of the inverter, so that the mounting rails are aligned together and the ACCB base is as close to the inverter as possible. The gap between the ACCB and the inverter should be no more than 1/16 inch.
3. Secure the ACCB in place with six #10 wood screws of an appropriate length (or lag bolts) in the six mounting and keyhole slots on the mounting rails of the ACCB.
4. Leave the top cover off the ACCB to proceed with wire connections.

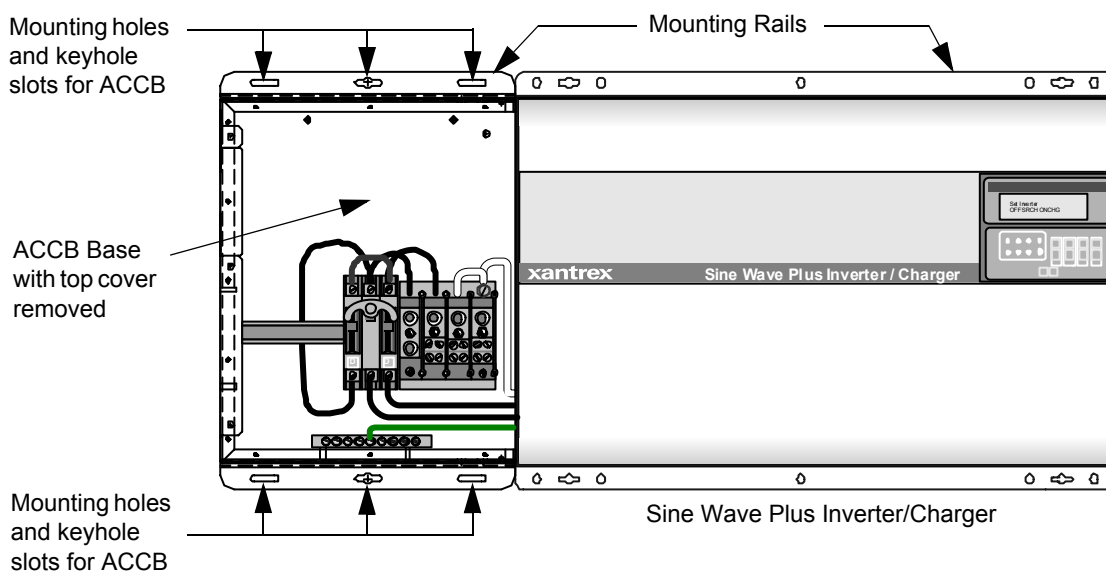


Figure 1-10 Installing the ACCB on the Sine Wave Plus Inverter Charger

Pre-Wiring Preparation

The **ACCB** is pre-wired at the factory and ready for connection to the **Sine Wave Plus Inverter/Charger**. The factory-installed wires are labeled to assist with the installation procedure.



WARNING: Electrical Hazard

Do not remove or alter in any way the pre-installed factory wiring. Any changes can result in personal injury and/or equipment damage, and will void your warranty.



WARNING: Fire Hazard

A possible fire hazard can exist if 120 Vac only sources (such as inverters and generators) are wired incorrectly into 120/240 Vac distribution panels containing multiwire branch circuits.

Accessing the Terminal Blocks

Consult the Sine Wave Plus Inverter/Charger Owner's Manual for additional information on wire and disconnect requirements.

To prepare the ACCB and Inverter for wiring installation:

1. Expose the terminal block in the **ACCB** by removing the **ACCB** cover, as described on [page 1-11](#).
2. Expose the terminal block in the inverter by removing the AC access cover, as described in your inverter's owner's guide.

Wire Sizes and Disconnect Requirements

- ◆ Determine the wire sizes and disconnect sizes required for the installation. See [Table 1-1](#) for disconnects and wire sizes and [Table 1-2](#) for torque values.

Important: Only use copper conductors rated for 75 °C (167 °F).

Table 1-1 AC Disconnect and Wire Sizing

Full Pass-Through Capability	Maximum Fuse/Breaker Required	Cable Size Required in Conduit
60 Amps	60 Amps	#6 AWG (THHN)

The distribution blocks in the ACCB AC terminal block accept the following gauge wires.

- The 1:1 distribution blocks accept #2/0 - 14 AWG.
- The 1:4 distribution blocks accept #2/0 - 14 AWG on the single terminal and #4-14 AWG on the quad terminals.

The ground bar in the ACCB accepts #4 to 14 AWG wires.

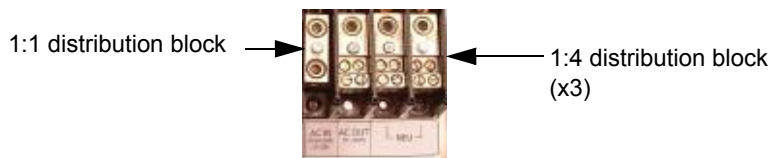


Figure 1-11 ACCB AC Terminal Block Distribution Blocks

Table 1-2 Torque Values for Wiring

Wire Gauge	Torque Value
14 - 10 AWG	20 lb-in
8 AWG	25 lb-in
6 - 4 AWG	36 lb-in
4 - 2/0 AWG	50 lb-in



WARNING: Electrical Hazard

Be sure to connect the ground wires first when connecting AC wiring to prevent a potential shock hazard.



CAUTION: Equipment Damage

The inverter's AC output must never be wired to the utility or generator output. This will cause severe damage to the inverter which is not covered under warranty.

Important: These instructions assume that the DC connections have already been made and that the system ground has already been established. Consult the Sine Wave Plus Owner's Manual for additional wiring information.

Important: Be sure to use wire-ties as needed to keep field and factory-installed wiring neat and tidy so it does not interfere with airflow through the ACCB into the Sine Wave Plus Inverter/Charger.

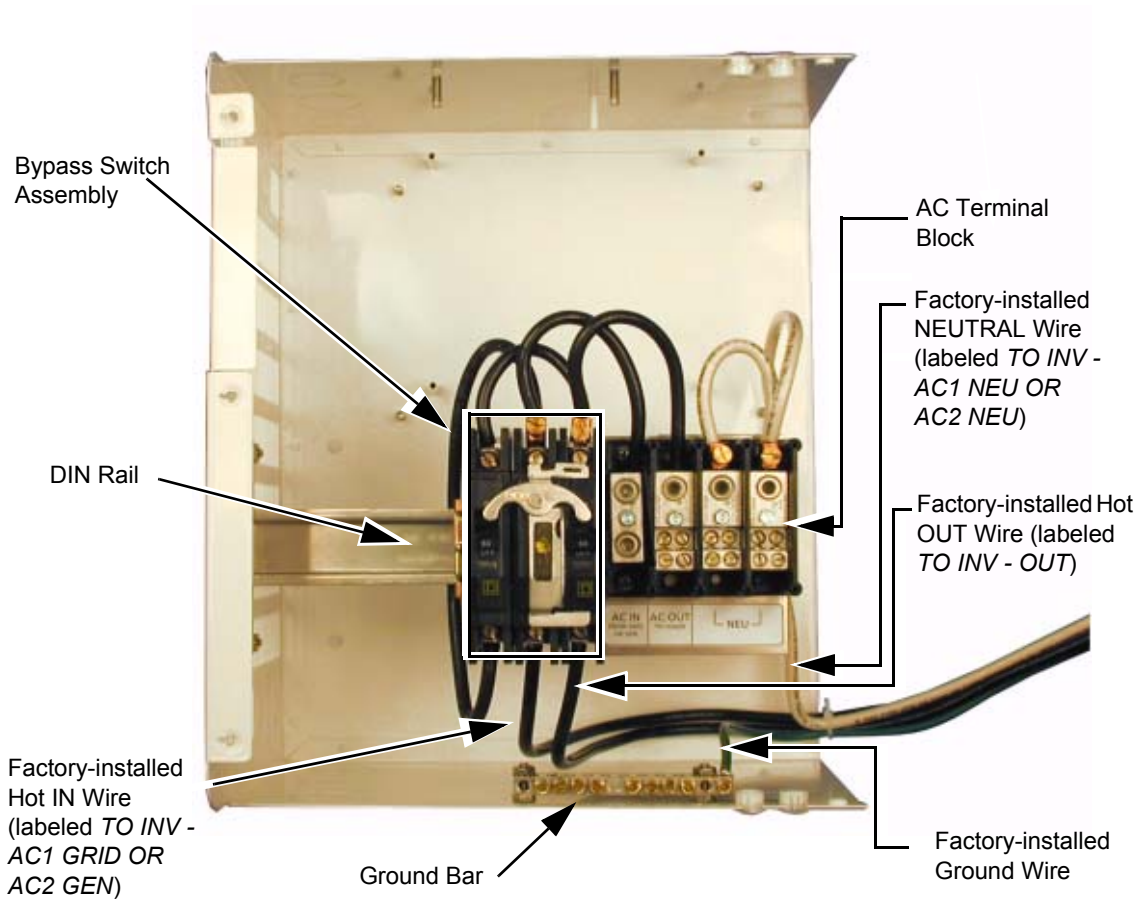


Figure 1-12 ACCB Internal Components and Factory-installed Wiring

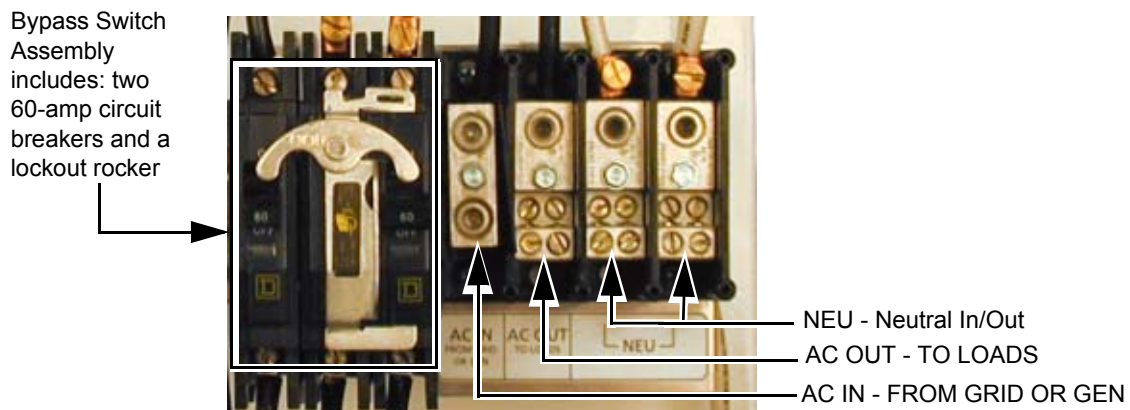


Figure 1-13 ACCB AC Terminal Block For Customer-installed Wiring

Wiring for Off-Grid Applications Using an AC Distribution Panel and an External Generator Disconnect

The following diagram shows the complete wiring diagram for wiring the ACCB and Sine Wave Plus Inverter inputs and outputs in an off-grid application using an AC distribution panel for the outputs and a 120 Vac generator for input. Wiring instructions are provided for making ground connections first ([page 1-19](#)), neutral connections second ([page 1-20](#)), and hot connections last ([page 1-21](#)).

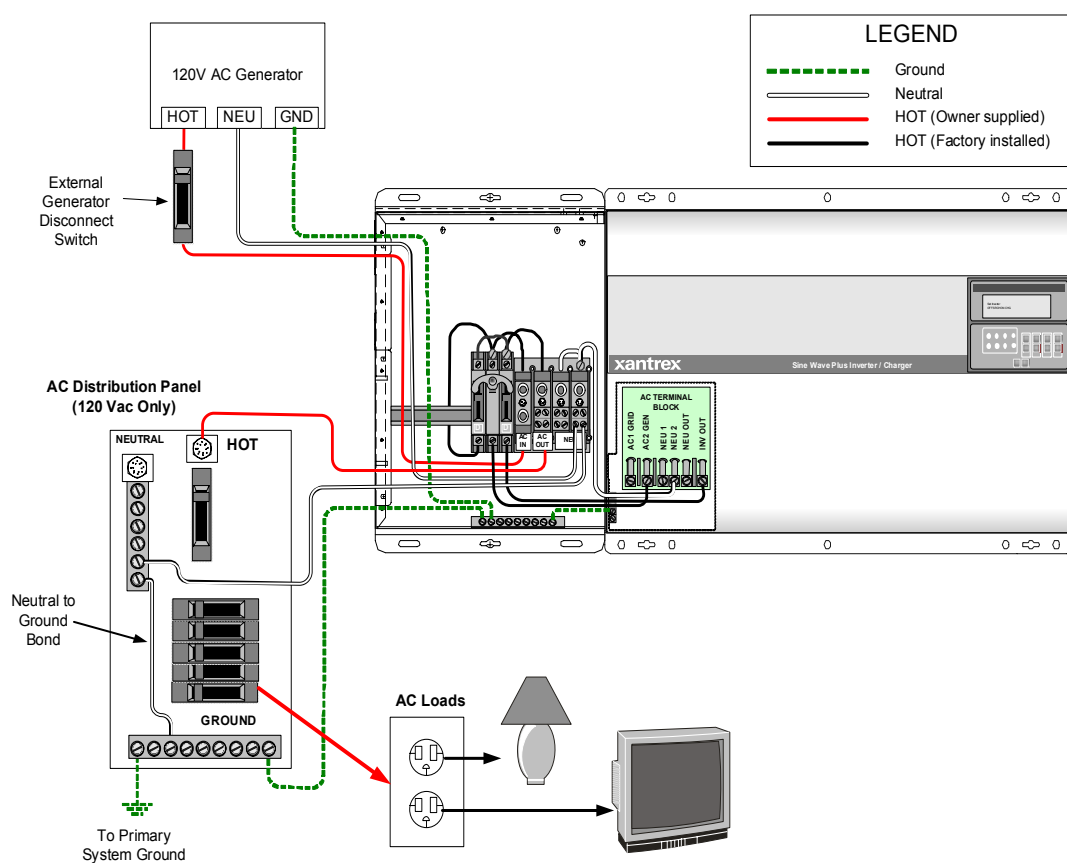


Figure 1-14 Wiring an Off-Grid Application Using an AC Distribution Panel and an External Generator Disconnect Switch



WARNING: Shock Hazard

Ensure that all AC and DC power is not “live” before proceeding.

To make the ground connections:

1. Prepare the primary system ground and connect it to the ground bar in the main AC distribution panel. See the Sine Wave Plus Inverter/Charger Owner's Manual for information regarding preparing the primary system ground.
2. Route cable(s) (hot, neutral, and ground) from the AC distribution panel through one of the knockouts prepared in the **ACCB** and connect the ground wire (green) to the ground bar in the **ACCB**.
3. Connect the factory-installed ground wire (green) in the **ACCB** to the AC ground bar in the inverter.
4. Prepare the cabling from the generator.
 - a) Route the hot wire (black) from the generator through a disconnect switch.
 - b) Route cable(s) (hot, neutral, and ground) from the generator and generator disconnect switch into one of the knockouts prepared in the **ACCB**. Connect the ground wire (green) from the generator to the ground bar in the **ACCB**.

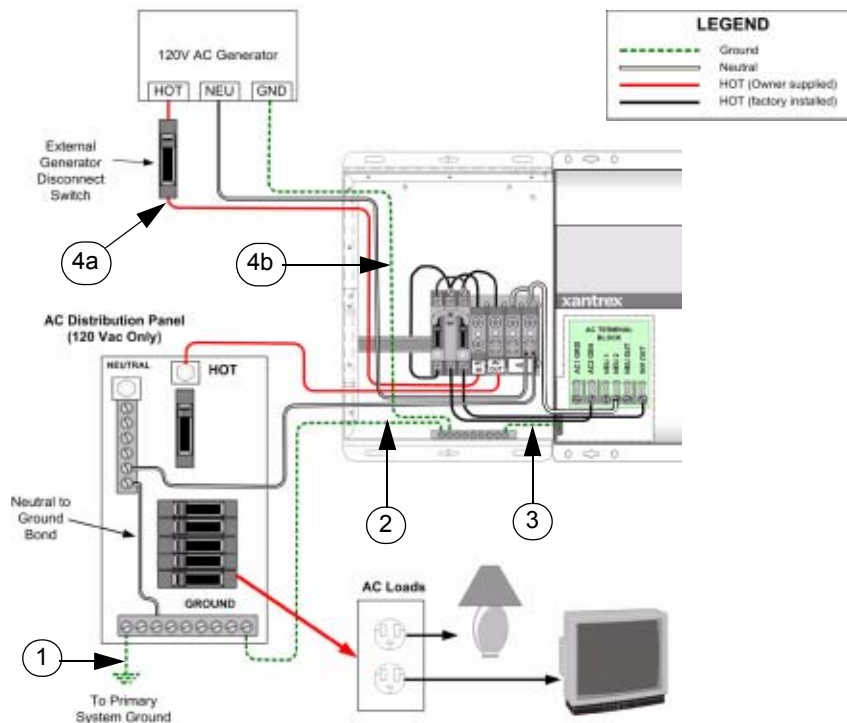


Figure 1-15 Ground Connections for an Off-Grid Application with an AC Distribution Panel and an External Generator Disconnect

To make the neutral connections:

1. Create only one neutral-to-ground bond in the system. In this case, it would be in the main AC distribution panel.

Important: Ensure there is only one neutral-to-ground bond in the entire system. See the Sine Wave Plus Inverter/Charger Owner's Manual for additional information regarding the neutral-to-ground bond requirements.

2. Connect the neutral (white) wire from neutral bar in the AC distribution panel to one of the neutral terminals in the **ACCB**.
3. Connect the factory-installed neutral wire (white) in the **ACCB** to the NEU2 terminal in the inverter.
4. Connect the neutral (white) wire from the generator and connect it to one of the neutral terminals in the **ACCB**.

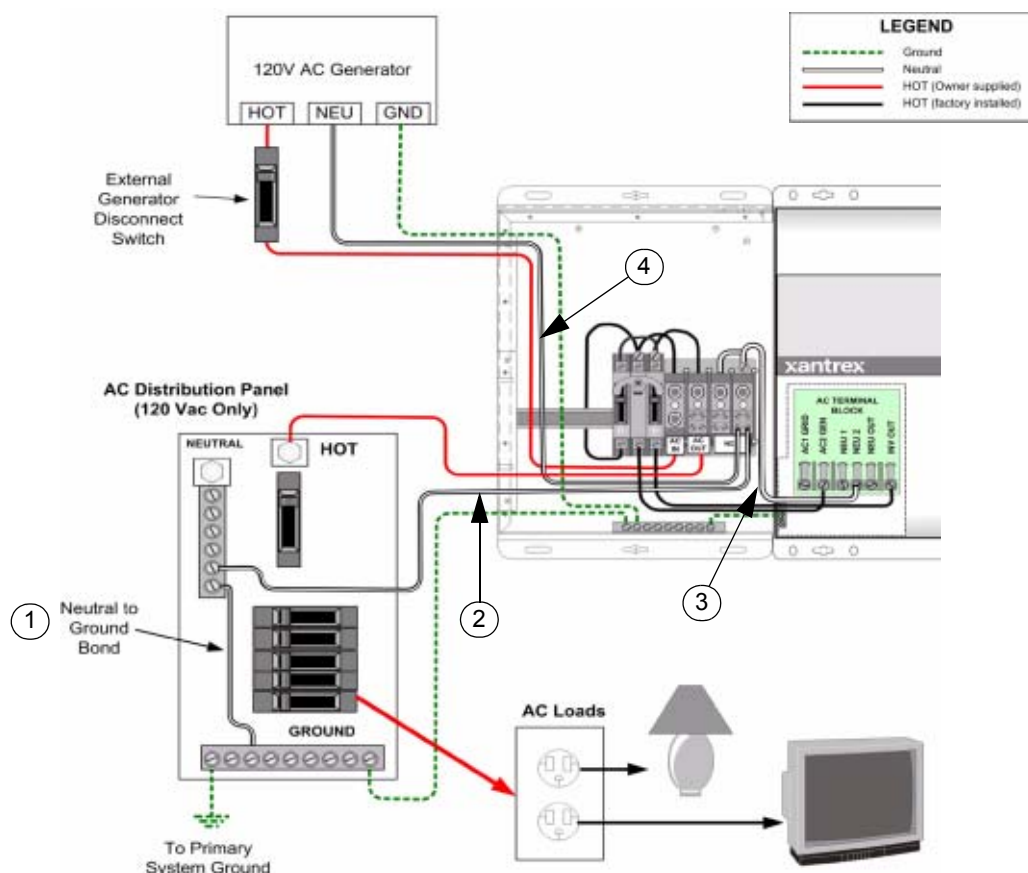


Figure 1-16 Neutral Connections for an Off-Grid Application with an AC Distribution Panel and an External Generator Disconnect

To make the hot connections:

1. Connect the factory-installed hot (black) wire from the Inverter Input Breaker in the **ACCB** to the AC2 GEN terminal in the inverter.
2. Connect the factory-installed hot wire (black) from the Inverter Output Breaker in the **ACCB** to the INV OUT terminal in the inverter.
3. Connect a HOT (Black) wire AC OUT in the **ACCB** to the HOT IN in the AC Distribution Panel.
4. Connect a hot (black) wire from the generator disconnect to the AC IN terminal in the **ACCB**.

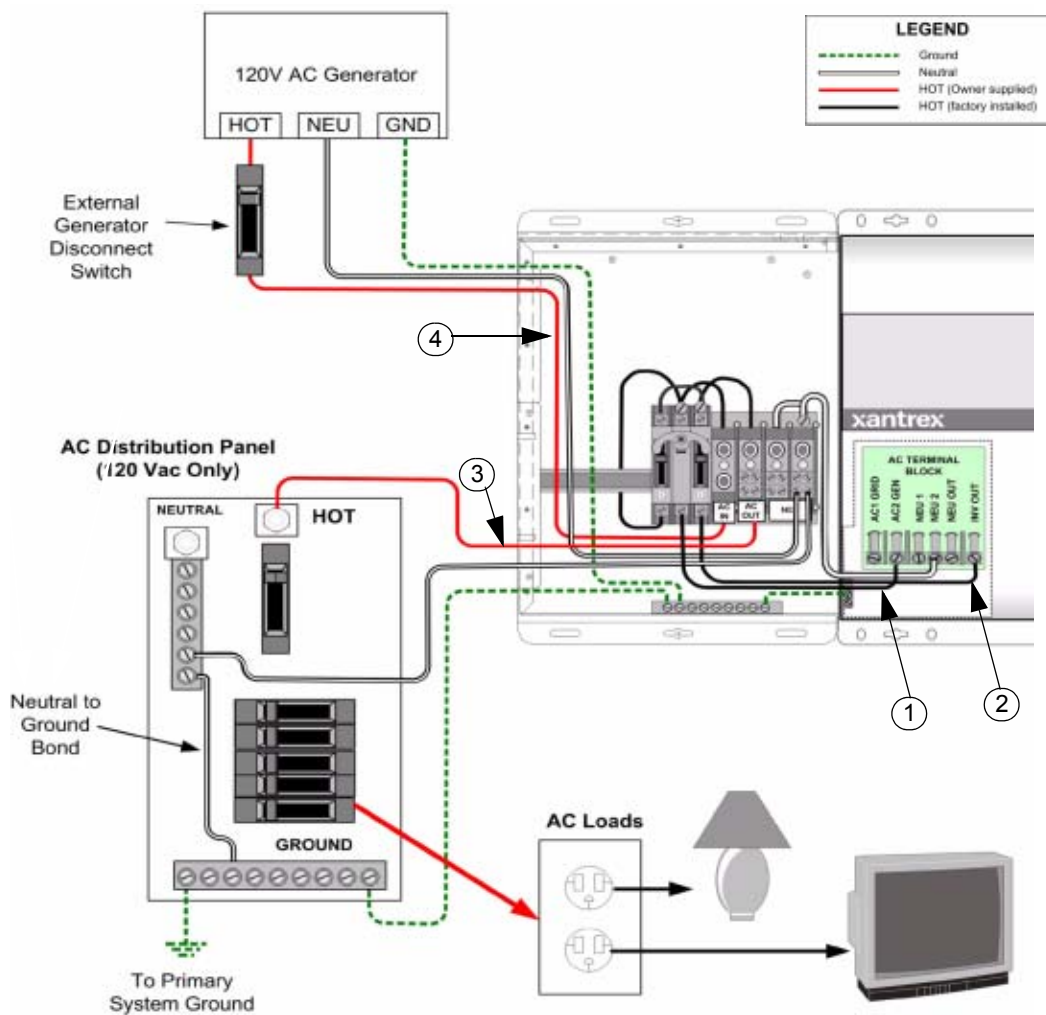


Figure 1-17 Hot Connections for an Off-grid Application with an AC Distribution Panel and an External Generator Disconnect

Wiring for Off-Grid Applications using an AC Distribution Panel and an Internal Generator Disconnect

The following diagram shows the complete wiring diagram for wiring the ACCB and Sine Wave Plus Inverter inputs and outputs in an off-grid application using an AC distribution panel for the outputs and a 120 Vac generator for input. This diagram also includes the use of a generator disconnect breaker in the ACCB. Wiring instructions are provided for making ground connections first (page 1-23), neutral connections second (page 1-24), and hot connections last (page 1-25).

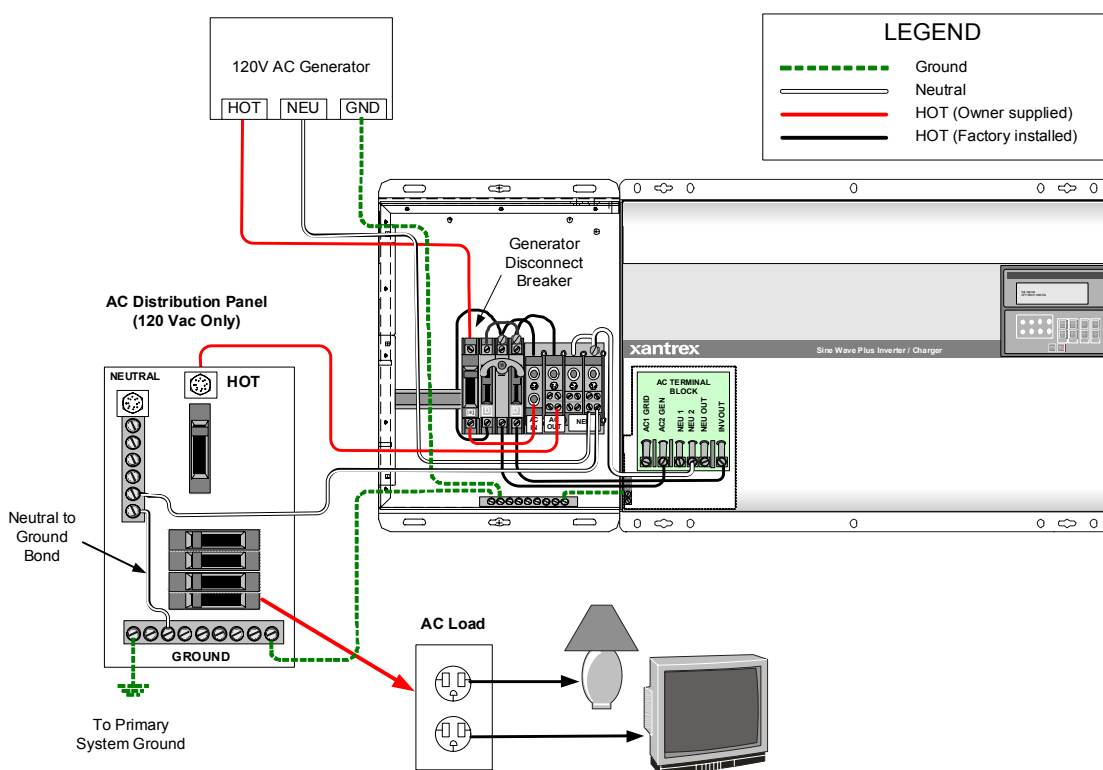


Figure 1-18 Wiring an Off-grid Application Using an AC Distribution Panel and an Internal Generator Disconnect Breaker



WARNING: Shock Hazard

Ensure that all AC and DC power is not “live” before proceeding.

To make the ground connections:

1. Prepare the primary system ground and connect it to the ground bar in the main AC distribution panel. See the Sine Wave Plus Inverter/Charger Owner's Manual for information regarding preparing the primary system ground.
2. Route cable(s) (hot, neutral, and ground) from the AC distribution panel through one of the knockouts prepared in the **ACCB** and connect the ground wire (green) to the ground bar in the **ACCB**.
3. Connect the factory-installed ground wire (green) in the **ACCB** to the AC ground bar in the inverter.
4. Prepare the cabling from the generator. Route cable(s) (hot, neutral, and ground) from the generator into one of the knockouts prepared in the **ACCB**. Connect the ground wire (green) from the generator to the ground bar in the **ACCB**.

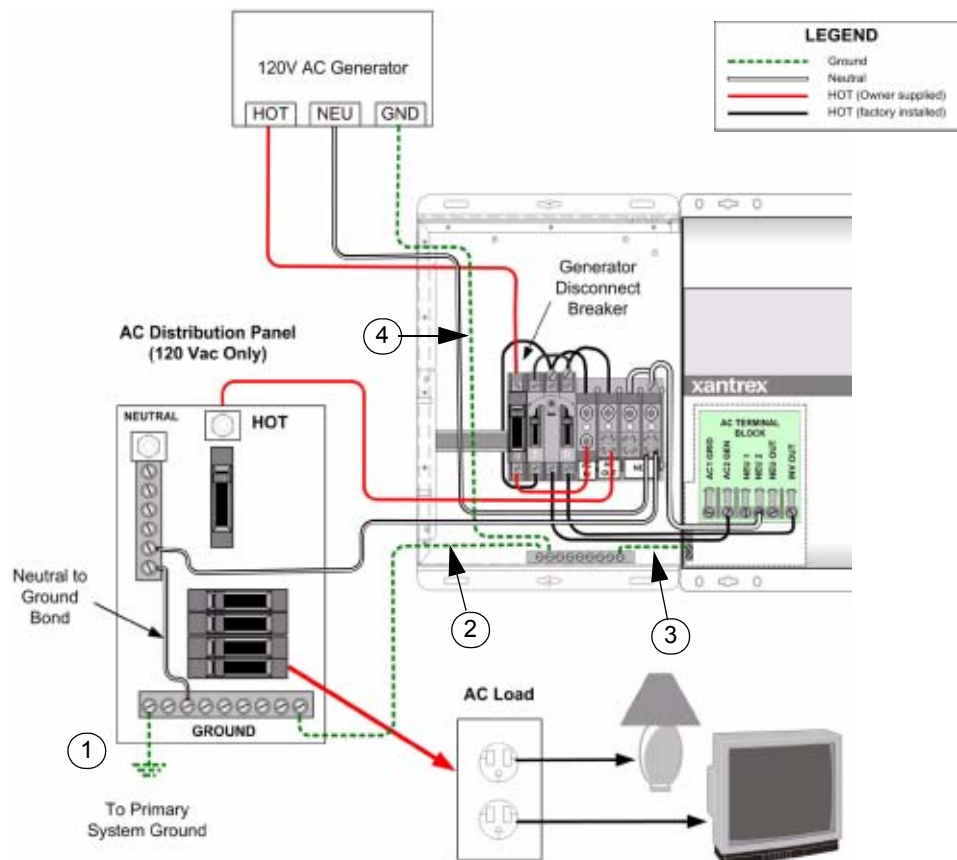


Figure 1-19 Ground Connections for an Off-Grid Application with an AC Distribution Panel and an Internal Generator Disconnect Breaker

1. Create only one neutral-to-ground bond in the system. In this case, it would be in the main AC distribution panel.

2. Connect the neutral (white) wire from the neutral bar in the AC distribution panel to one of the neutral terminals in the **ACCB**.
3. Connect the factory-installed neutral wire (white) in the **ACCB** to the NEU2 terminal in the inverter.
4. Connect the neutral (white) wire from the generator and connect it to one of the neutral terminals in the **ACCB**.



To make the hot connections:

1. Connect the factory-installed hot (black) wire from the Inverter Input Breaker in the **ACCB** to the AC2 GEN terminal in the inverter.
2. Connect the factory-installed hot wire (black) from the Inverter Output Breaker in the **ACCB** to the INV OUT terminal in the inverter.
3. Connect a hot (black) wire from the AC OUT in the **ACCB** to the HOT IN on the AC distribution panel.
4. Connect another hot (black) wire from the generator disconnect breaker to the AC IN terminal in the ACCB.
5. Connect the hot (black) wire from the generator to the top of the generator disconnect breaker.

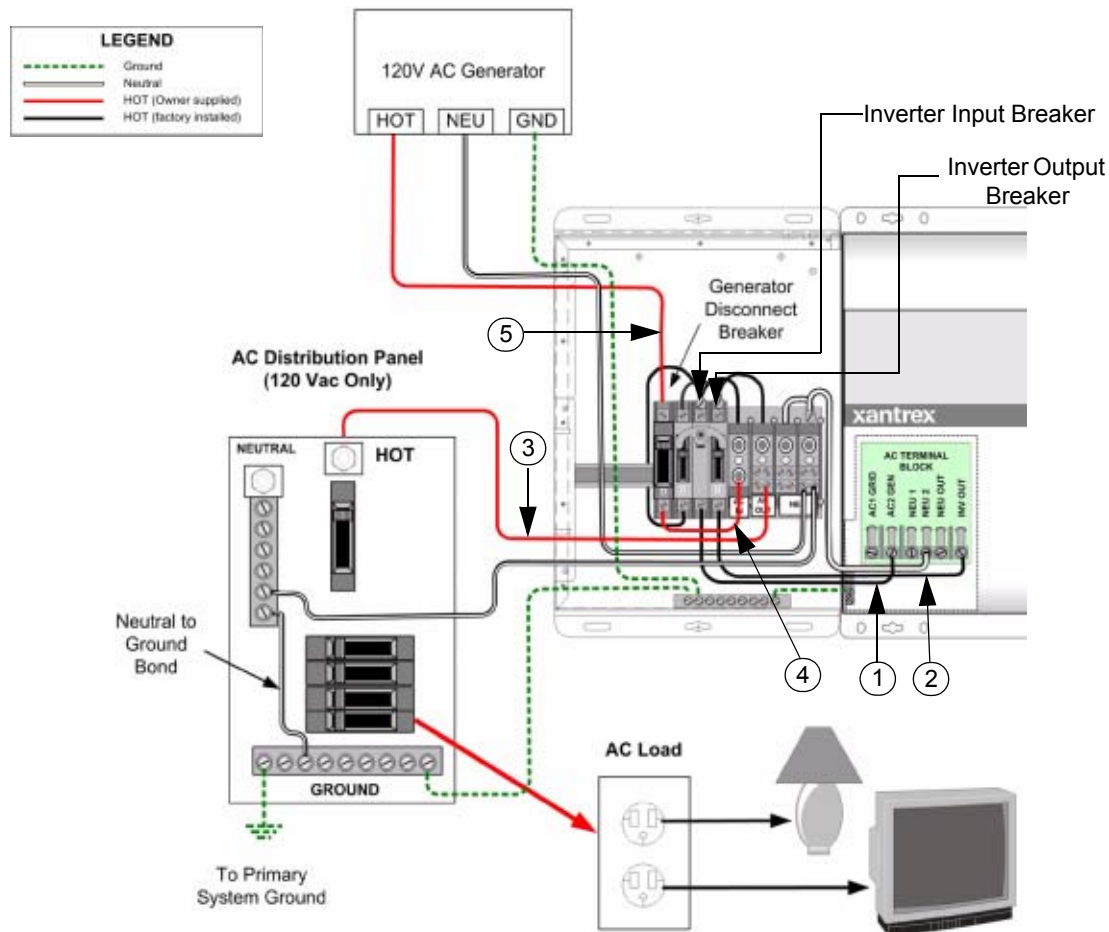


Figure 1-21 Hot Connections for an Off-Grid Application with an AC Distribution Panel and an Internal Generator Disconnect

Wiring for Off-Grid Applications Using Additional Circuit Breakers in the ACCB Only

The following diagram shows the complete wiring diagram for wiring the ACCB and Sine Wave Plus Inverter inputs and outputs in an off-grid application using additional circuit breakers in the ACCB for the outputs and a 120 Vac generator for input. This diagram also includes the use of a generator disconnect breaker in the ACCB. Wiring instructions are provided for making ground connections first ([page 1-27](#)), neutral connections second ([page 1-28](#)), and hot connections last ([page 1-29](#)).

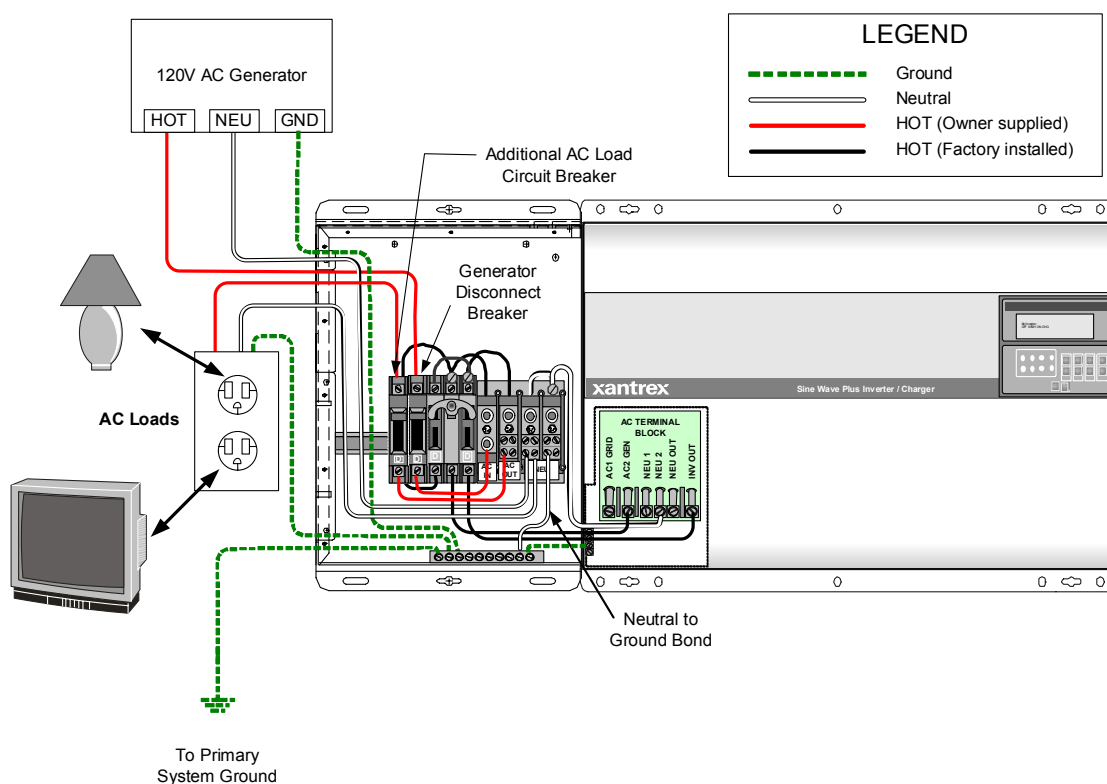


Figure 1-22 Wiring an Off-Grid Application Using Additional Circuit Breakers in the ACCB Only



WARNING: Shock Hazard

Ensure that all AC and DC power is not “live” before proceeding.

1-27

1. Prepare the primary system ground and, routing it through one of the knockouts prepared in the **ACCB**, connect it to the ground bar in the **ACCB**. See the Sine Wave Plus Inverter/Charger Owner's Manual for information regarding preparing the primary system ground.
2. Connect the factory-installed ground wire (green) in the **ACCB** to the AC ground bar in the inverter.
3. Prepare the cabling from the generator. Route cable(s) (hot, neutral, and ground) from the generator into one of the knockouts prepared in the **ACCB**. Connect the ground wire (green) from the generator to the ground bar in the **ACCB**.
4. Route and connect a ground wire from the ground bar in the **ACCB** to the outlet that will support the AC load.

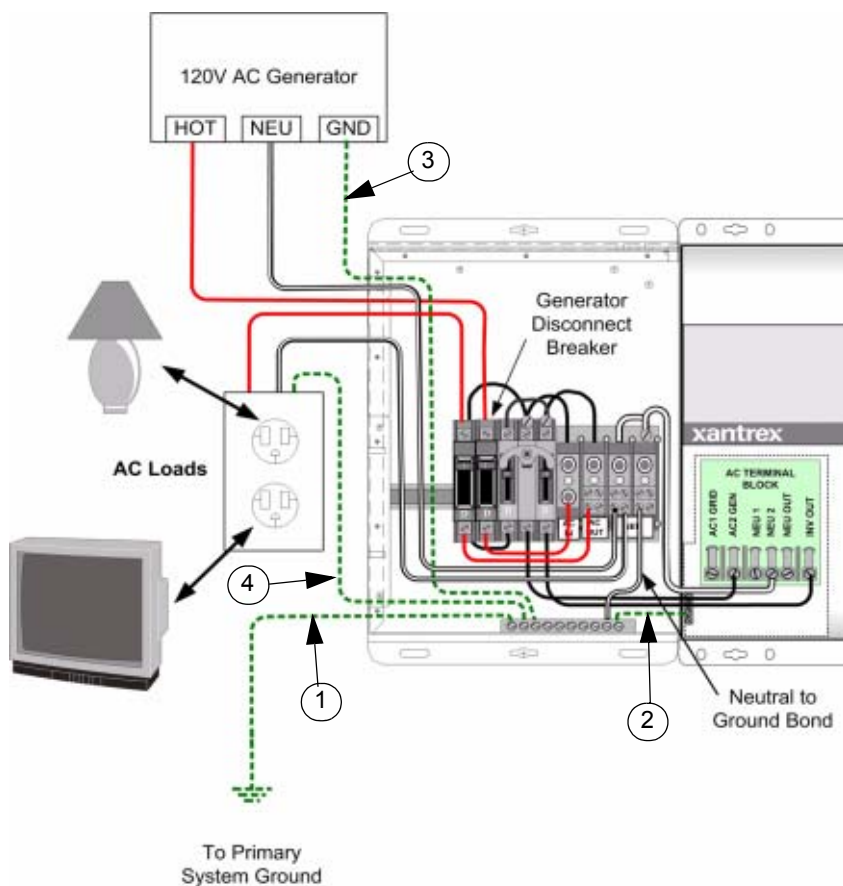


Figure 1-23 Ground Connections for an Off-Grid Application with Additional Circuit Breakers in the ACCB

1. Create only one neutral-to-ground bond in the system. In this case, it would be in the **ACCB**.

2. Connect the factory-installed neutral wire (white) in the **ACCB** to the NEU2 terminal in the inverter.
3. Connect the neutral (white) wire from the generator (or generator disconnect) and connect it to one of the neutral terminals in the ACCB.
4. Route and connect a neutral wire from one of the neutral connections in the ACCB to the outlet that will support the AC load.



To make the hot connections:

1. Connect the factory-installed hot (black) wire from the Inverter Input Breaker in the **ACCB** to the AC2 GEN terminal in the inverter
2. Connect the factory-installed hot wire (black) from the Inverter Output Breaker in the **ACCB** to the INV OUT terminal in the inverter.
3. Connect another hot (black) wire from the generator disconnect breaker to the AC IN terminal in the **ACCB**. Connect the other end of that same hot (black) wire to the bottom of the generator disconnect breaker.
4. Connect another hot (black) wire from the AC OUT terminal in the **ACCB** to the bottom of the new circuit breaker.
5. Connect the hot (black) wire from the generator to the top of the generator disconnect breaker.
6. Connect another hot (black) wire from the top of the additional circuit breaker to the outlet that will support the AC load.

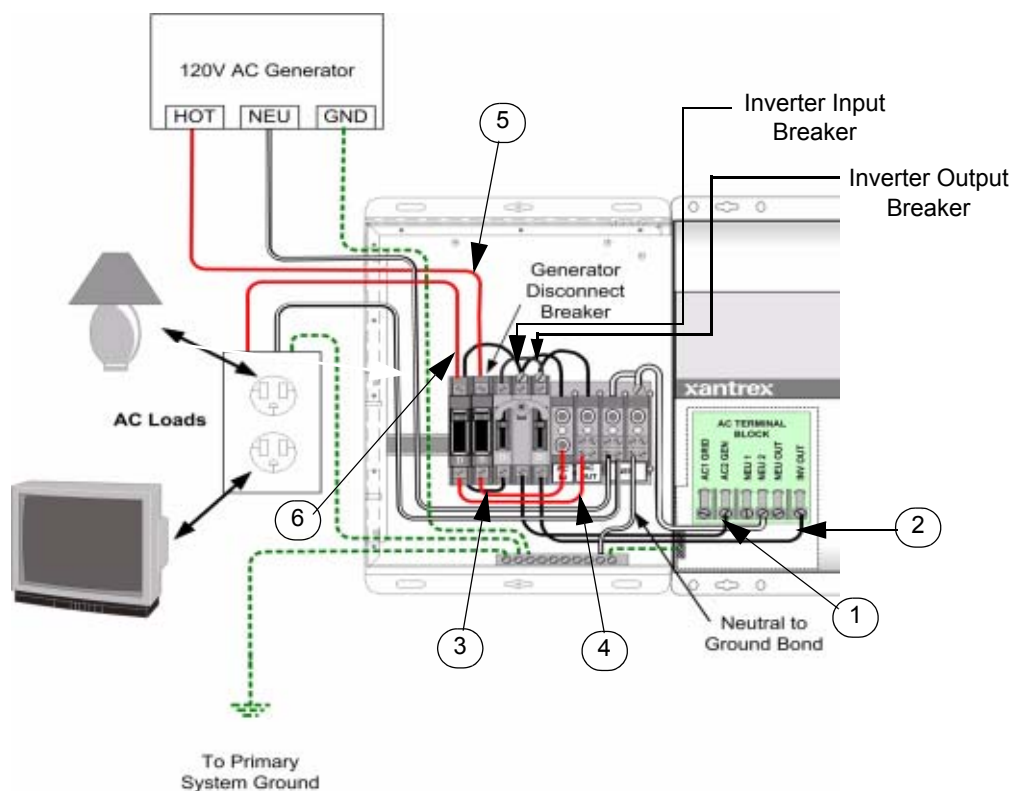


Figure 1-25 Hot Connections for an Off-grid Application with Additional Circuit Breakers in the ACCB

Wiring for On-Grid Applications Using an AC Distribution Panel and an Internal Generator Disconnect Breaker

The following diagram shows the complete wiring diagram for wiring the ACCB and Sine Wave Plus Inverter inputs and outputs in an on-grid application using an AC distribution panel for the outputs and a 120 Vac generator for input. This diagram also uses an internal generator disconnect breaker in the ACCB. Wiring instructions are provided for making ground connections first (page 1-31), neutral connections second (page 1-32), and hot connections last (page 1-33).

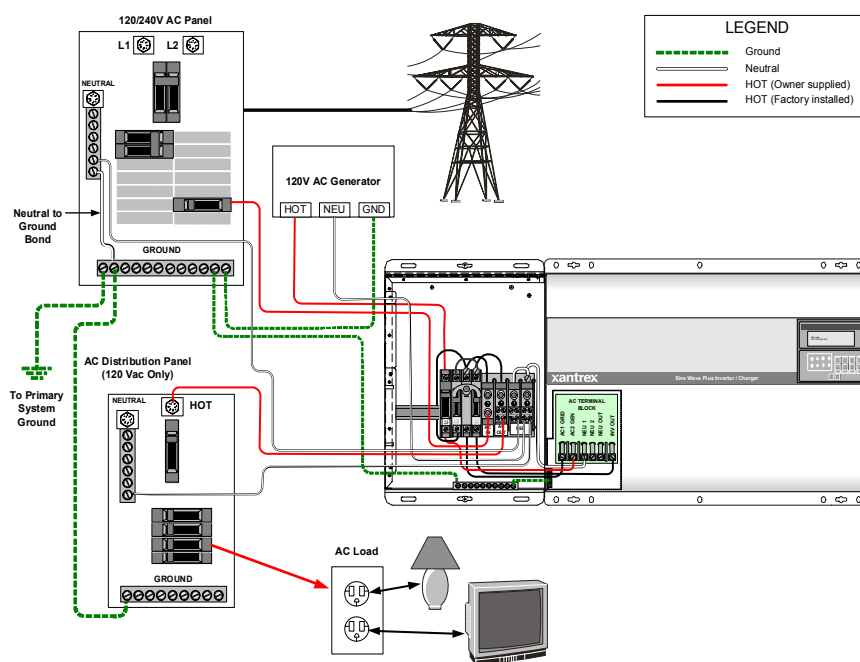


Figure 1-26 Wiring an On-grid Application USING an AC Distribution Panel



WARNING: Shock Hazard

Ensure that all AC and DC power is not “live” before proceeding.

Important: The inverter bypass circuit breaker can only be wired directly to, and work with, a single AC source. In a system that has multiple AC sources, you must decide which AC source will be wired through the inverter bypass circuit breaker and which will not. The following illustrations assume that the primary AC input source will be the utility grid.

To make the ground connections:

1. Prepare the primary system ground and connect it to the ground bar in the main AC distribution panel. See the Sine Wave Plus Inverter/Charger Owner's Manual for information regarding preparing the primary system ground.
2. Connect a ground wire (green) from the main AC distribution panel to the ground bar in the sub panel.
3. Route cable(s) (hot, neutral, and ground) from the main AC distribution panel through one of the knockouts prepared in the **ACCB** and connect the ground wire (green) to the ground bar in the **ACCB**.
4. Connect the factory-installed ground wire (green) in the **ACCB** to the AC ground bar in the inverter.
5. Connect the ground wire (green) from the generator to the ground bar in the main AC distribution panel.

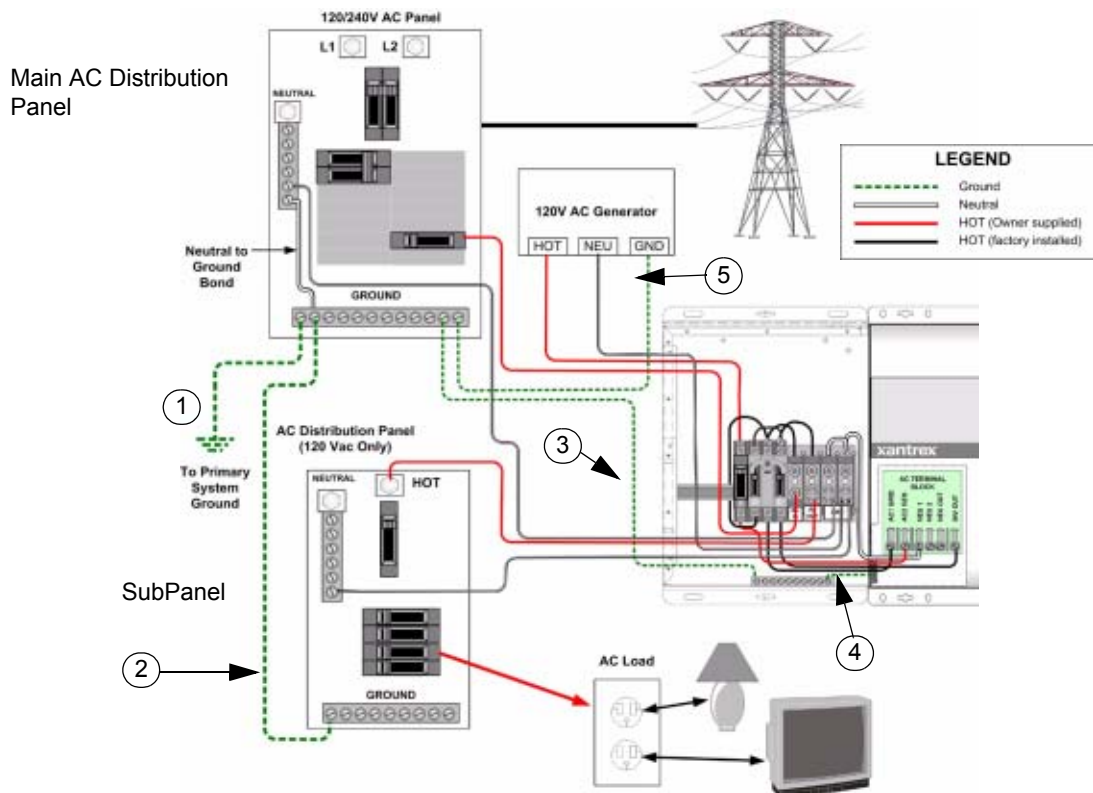


Figure 1-27 Ground Connections for an On-Grid Application with an AC Distribution Panel (sub panel) and a Generator Disconnect Breaker in the ACCB

1. Ensure there is only one neutral-to-ground bond in the system. In this case, it would be in the main AC distribution panel.

2. Connect the neutral (white) wire from the neutral bar in the main AC distribution panel to one of the neutral terminals in the **ACCB**.
3. Connect a neutral (white) wire from the sub panel to one of the neutral terminals in the **ACCB**.
4. Connect the factory-installed neutral wire (white) in the **ACCB** to the NEU1 terminal in the inverter.
5. Connect the neutral (white) wire from the generator (or generator disconnect) and connect it to one of the neutral terminals in the **ACCB**.



To make the hot connections:

1. Connect the factory-installed hot (black) wire from the Inverter Input Breaker in the **ACCB** to the AC1 GRID terminal in the inverter
2. Connect the factory-installed hot wire (black) from the Inverter Output Breaker in the **ACCB** to the INV OUT terminal in the inverter.
3. Connect the hot (black) wire from the main AC distribution panel to the AC IN terminal in the **ACCB**.
4. Connect the hot (black) wire from the generator to the top of the generator disconnect breaker in the **ACCB**.
5. Connect another hot (black) wire from the bottom of that same generator disconnect breaker in the **ACCB** to the AC2 GEN terminal.
6. Connect a hot (black) wire from the AC OUT terminal in the **ACCB** to the sub panel.

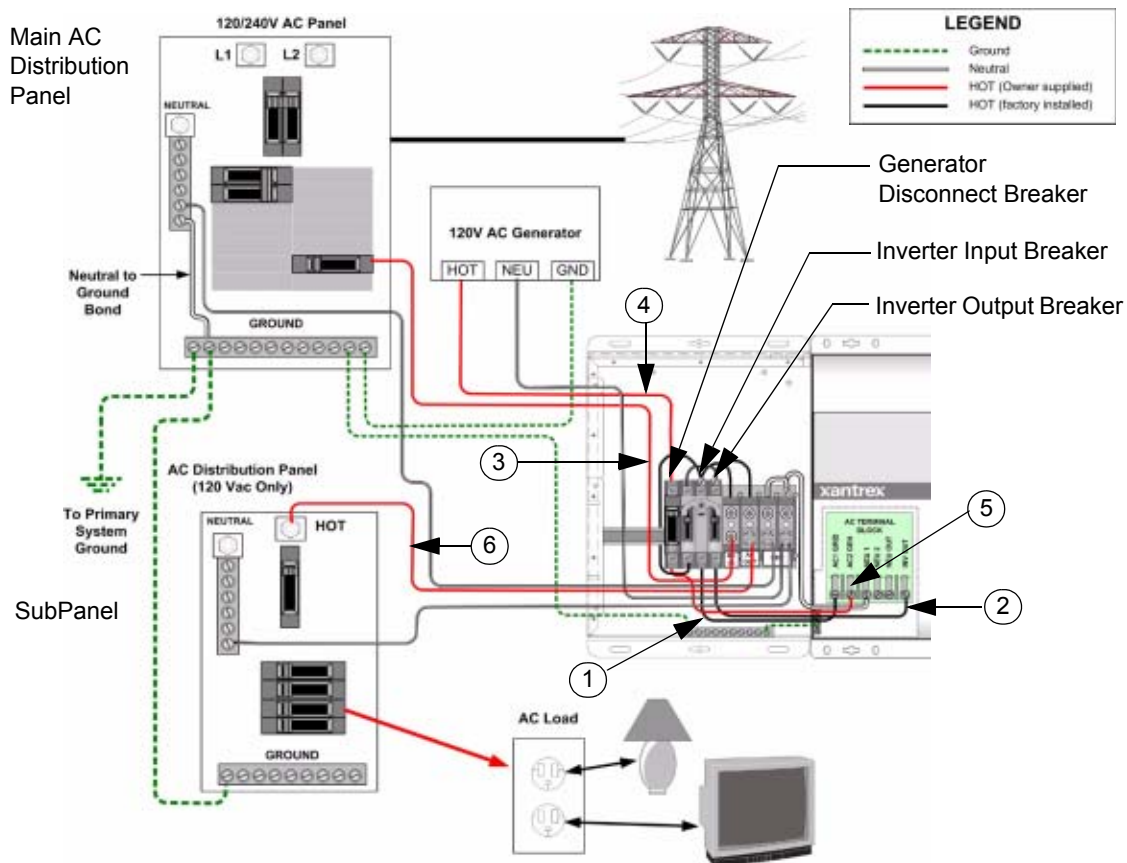


Figure 1-29 Hot Connections for an On-Grid Application with an AC Distribution Panel and an Internal Generator Disconnect

Wiring for On-Grid Applications Using Additional Circuit Breakers in the ACCB Only

The following diagram shows the complete wiring diagram for wiring the ACCB and Sine Wave Plus Inverter inputs and outputs in an on-grid application using an AC distribution panel for the outputs and a 120 Vac generator for input. This diagram also uses an internal generator disconnect breaker in the ACCB. Wiring instructions are provided for making ground connections first (page 1-35), neutral connections second (page 1-36), and hot connections last (page 1-37).

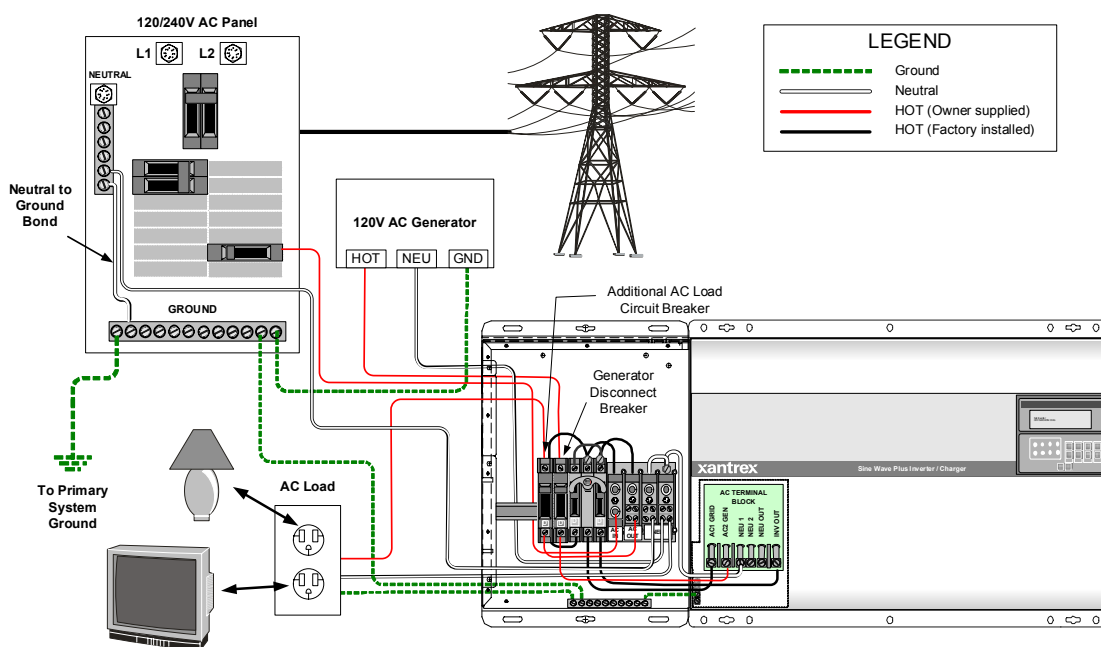


Figure 1-30 Wiring an On-Grid Application Using Additional Circuit Breakers in the ACCB Only



WARNING: Shock Hazard

Ensure that all AC and DC power is not “live” before proceeding.

Important: The inverter bypass circuit breaker can only be wired directly to, and work with, a single AC source. In a system that has multiple AC sources, you must decide which AC source will be wired through the inverter bypass circuit breaker and which will not. The following illustrations assume that the primary AC input source will be the utility grid.

To make the ground connections:

1. Prepare the primary system ground and connect it to the ground bar in the main AC distribution panel. See the Sine Wave Plus Inverter/Charger Owner's Manual for information regarding preparing the primary system ground.
2. Route cable(s) (hot, neutral, and ground) from the main AC distribution panel through one of the knockouts prepared in the **ACCB** and connect the ground wire (green) to the ground bar in the **ACCB**.
3. Connect the factory-installed ground wire (green) in the **ACCB** to the AC ground bar in the inverter.
4. Connect the ground wire (green) from the generator to the ground bar in the main AC distribution panel.
5. Route and connect a ground wire to the outlet that will be supporting the AC load.

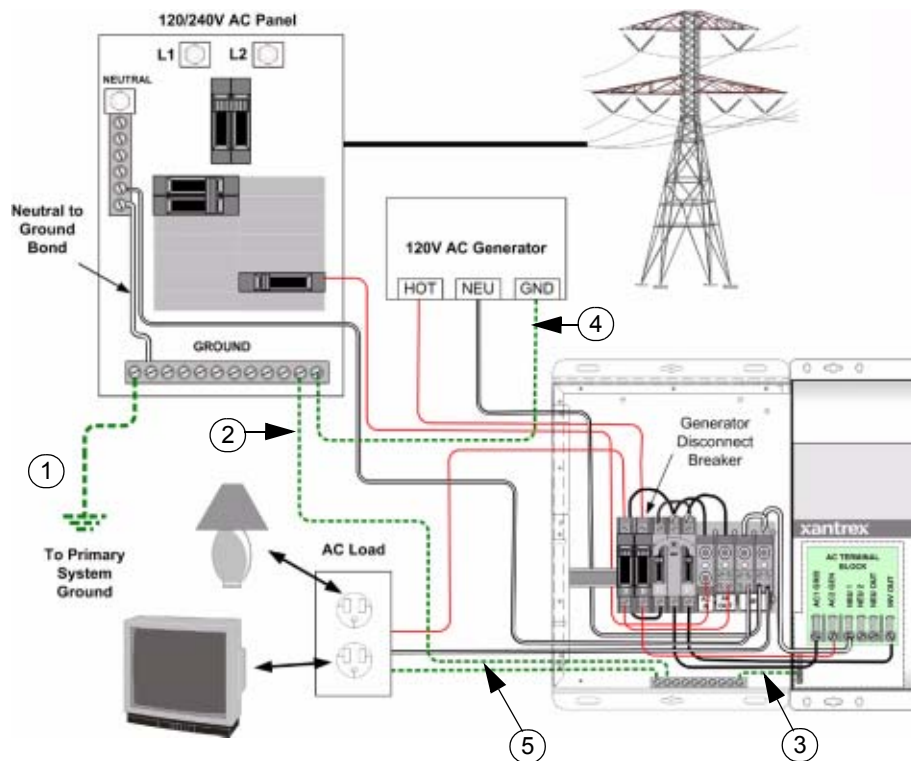


Figure 1-31 Ground Connections for an On-grid Application Using Additional Circuit Breakers in the ACCB Only

To make the neutral connections:

1. Ensure there is only one neutral-to-ground bond in the system. In this case, it would be in the main AC distribution panel.

Important: Ensure there is only one neutral-to-ground bond in the entire system. See the Sine Wave Plus Inverter/Charger Owner's Manual for additional information regarding the neutral-to-ground bond requirements.

2. Connect the neutral (white) wire from the neutral bar in the main AC distribution panel to one of the neutral terminals in the **ACCB**.
3. Connect the factory-installed neutral wire (white) in the **ACCB** to the NEU1 terminal in the inverter.
4. Connect the neutral (white) wire from the generator and connect it to one of the neutral terminals in the **ACCB**.
5. Route and connect a neutral (white) wire from one of the neutral terminals in the **ACCB** to the outlet that will be supporting the AC load.

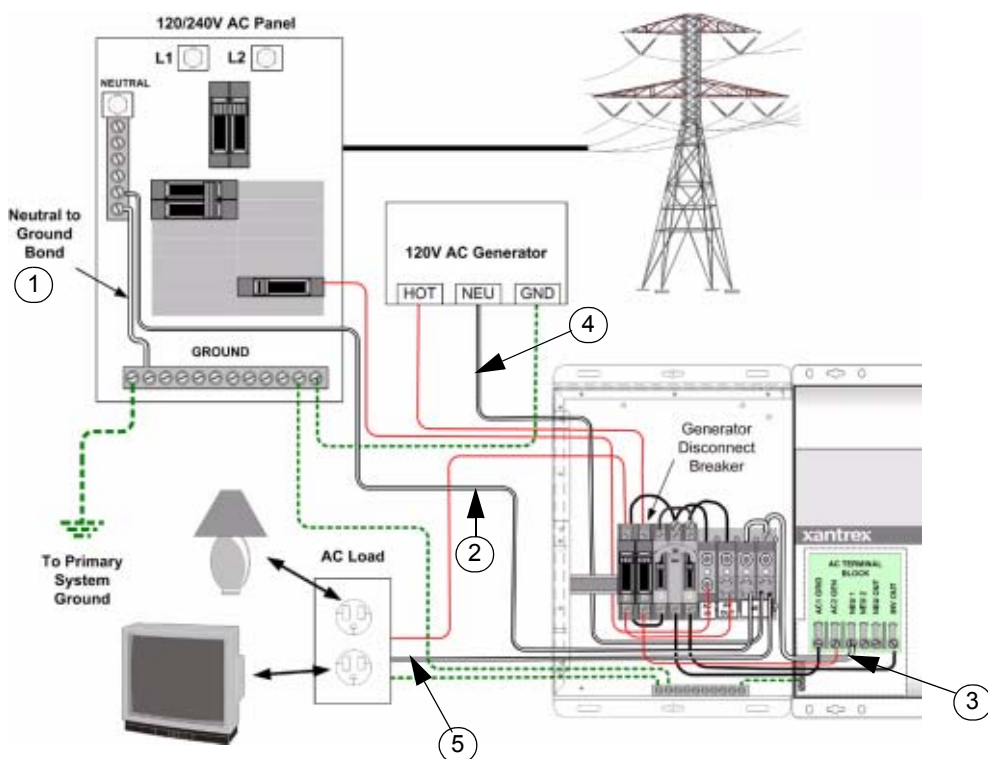


Figure 1-32 Neutral Connections for an On-Grid Application Using Additional Circuit Breakers in the ACCB Only

To make the hot connections:

1. Connect the factory-installed hot (black) wire from the Inverter Input Breaker in the **ACCB** to the AC1 GRID terminal in the inverter
2. Connect the factory-installed hot wire (black) from the Inverter Output Breaker in the **ACCB** to the INV OUT terminal in the inverter.
3. Connect the hot (black) wire from the main AC distribution panel to the AC IN terminal in the **ACCB**.
4. Connect the hot (black) wire from the generator to the top of the generator disconnect breaker in the **ACCB**.
5. Connect another hot (black) wire from the bottom of that same generator disconnect breaker in the **ACCB** to the AC2 GEN terminal.
6. Connect a hot (black) wire from the AC OUT terminal in the **ACCB** to the bottom of the additional circuit breaker installed in the **ACCB**
7. Connect another hot (black) wire from the top of that same additional circuit breaker in the **ACCB** and route to the outlet that will be supporting the AC load.

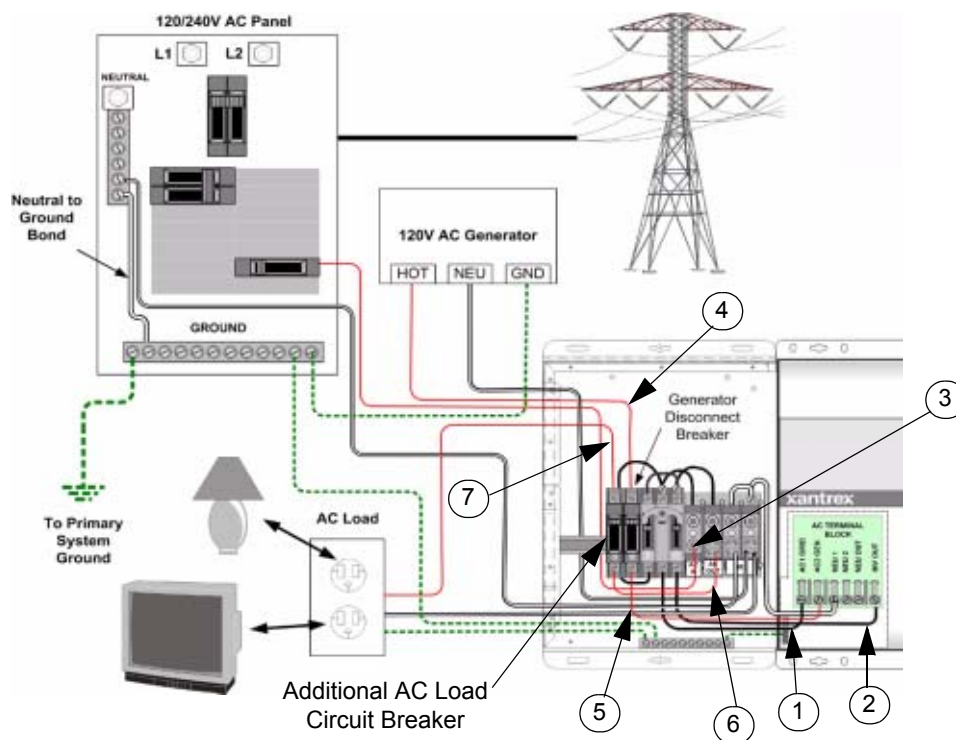


Figure 1-33 Hot Connections for an On-Grid Application Using Additional Circuit Breakers in the ACCB Only

Additional Accessory Wiring

If you have any of the following accessories connected (or to be connected) to your inverter, then you will also need to pass their connecting cables through the **ACCB** to the AC side of the inverter:

- Generator Start Module (GSM) for automatic generator control
- Auxiliary Load Module (ALM) for controlling auxiliary loads such as alarms, water pumps or ventilator fans
- Emergency Power Off (EPO) switch, Inverter Control Module (ICM), or an Inverter Communications Adapter (ICA) for remote control and monitoring of the inverter
- Inverter Stacking Control – Series (ISC-S) Cable for connecting to another inverter in a dual inverter configuration.

See your inverter owner's guide and the appropriate accessory guide for further information about the installation and configuration of these accessories.

Wiring for Dual Inverter Configurations

Series stacked **Sine Wave Plus** inverters with **ACCBs** installed are wired essentially the same as single inverters, with the following differences.

Installing the ISC-S Cable

The ISC-S cable must be run through one of the ISC-S/ICM cable slots provided on the sides of the **ACCB** (see [Figure 1-7 on page 1–10](#)). The cable slots are blocked with hole plugs. These hole plugs must be removed before inserting the ISC-S cable.

Remove the hole plug for the slot to be used by the cable only. Do not remove any other hole plugs. Ensure that all the other hole plugs are still in place as shown in [Figure 1-34](#)).

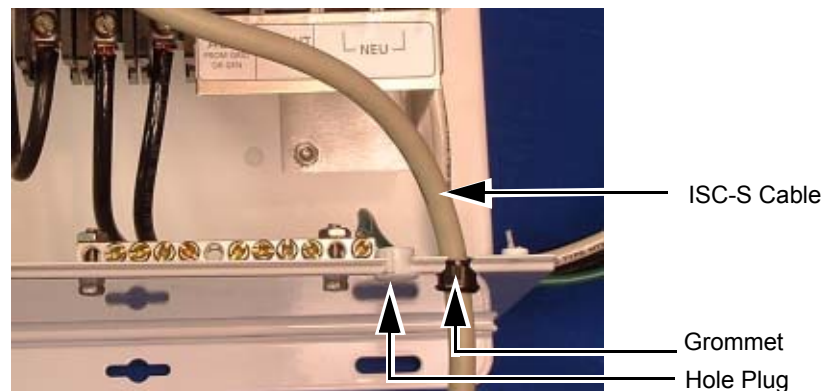


Figure 1-34 ISC-S Cable in an ISC-S/ICM Cable Slot of the **ACCB**

AC Neutral Wiring for Dual Configurations

All of the AC wiring for dual **Sine Wave Plus** inverters remains the same, except for two changes in the neutral wiring:

1. All NEUTRAL IN wiring goes *only* to the neutral terminals in the L1 **ACCB** (attached to the L1 **Sine Wave Plus** inverter).
2. A neutral bond between the inverters is created by connecting an owner supplied #6 AWG THHN neutral wire (white) from the **ACCB** neutral terminal attached to the L1 **Sine Wave Plus** inverter to the **ACCB** neutral terminal attached to the L2 **Sine Wave Plus** inverter.

This wire should be long enough to pass from the L2 inverter AC terminal block, through adjacent knockouts on both **ACCBs**, to the L1 inverter **ACCB** terminal block.

Installing the Safety Plate

The purpose of the Safety Plate (SP-1) is to prevent accidental contact with any live circuits or wires within the AC Conduit Box. The Safety Plate only needs to be installed in the event that the **Sine Wave Plus** is removed. The Safety Plate (SP-1) covers the open end of AC Conduit Box on the inverter side. It attaches to the base of the conduit box and is secured by the Sems screws that attach the top cover.



WARNING: Shock Hazard

Be sure to disconnect all DC and AC power before removing the inverter and installing the safety plate.

To install the safety plate:

3. Remove the two #8 Sems screws on the top and bottom of the ACCB. Put these screws in a safe place.
4. Slide the safety plate over the open end of the conduit box inserting the cover tabs into the slots on the safety plate. Be sure to align the holes for the screws for resecuring the top cover.
5. Replace the two #8 Sems screws on the top and bottom of the chassis to secure the Safety Plate into place.



Figure 1-35 Removing the Sems Screws From the ACCB Top Cover

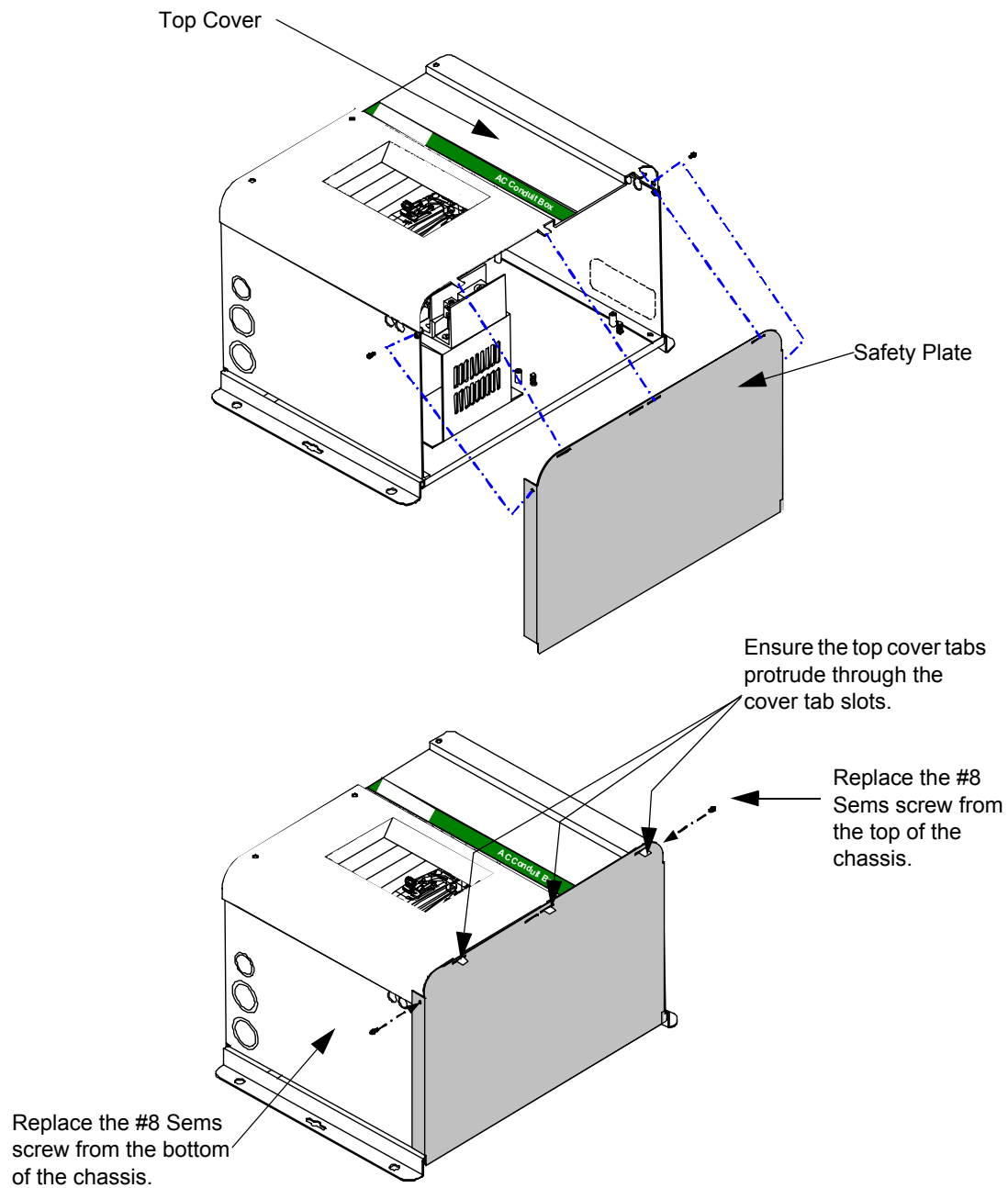


Figure 1-36 Installing the Safety Plate SP-1 on the ACCB

2

Operating the ACCB

Chapter 2, “Operating the ACCB” describes the different modes and operation of the Bypass Switch on the ACCB.

The following topics are covered in this chapter.

For this topic:	See:
“The Bypass Switch”	page 2–2
“Operating the Bypass Switch”	page 2–2
“Dual Inverters: 240 Vac Loads”	page 2–4

The Bypass Switch

During normal operation (Figure 2-2 on page 2–3), AC power passes from the external AC source (generator or grid) through the inverter to the AC loads. The inverter monitors the incoming power and can keep the batteries charged.

When external sources of AC power are not available, the inverter switches to external DC power (e.g., batteries, generator, solar, wind, hydro fuel cell) and continues to power the load.

When performing inverter maintenance, the breakers can be switched to the Bypass Operation (Figure 2-3 on page 2–3) which allows the AC loads to be powered directly from the the external AC source without affecting connected AC loads.

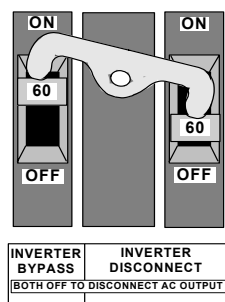
To de-energize both circuits, switch the breaker pair to the OFF position (Figure 2-4 on page 2–4).

Operating the Bypass Switch

Once the AC voltage has been applied, the bypass switch is ready for operation. Under normal operation the Inverter Output breaker is ON.

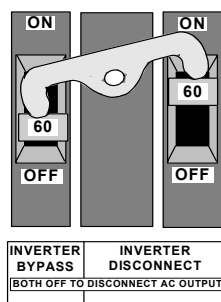
There are three possible modes of operation for the bypass switch:

- “Normal Operation”
- “Bypass Operation”
- “AC Input/Output Off”.



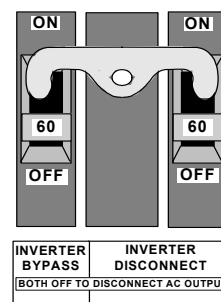
NORMAL OPERATION:
Left Breaker = ON
Right Breaker = OFF

Inverter AC power
available to Inverter
AC Distribution Panel



BYPASS OPERATION:
Left Breaker = OFF
Right Breaker = ON

Utility or Generator AC
power available to Inverter
AC Distribution Panel



AC OFF OPERATION:
Left Breaker = OFF
Right Breaker = OFF

Utility/Generator/Inverter AC
power disconnected to
Inverter AC Distribution Panel

Figure 2-1 Bypass Switch Mode Summary

Normal Operation

Inverter AC power passes through the inverter to the load (Figure 2-2).

In this configuration, power passes through the inverter to the connected load. When external AC power is not available, power from the external DC source is used by the inverter to power the AC loads.

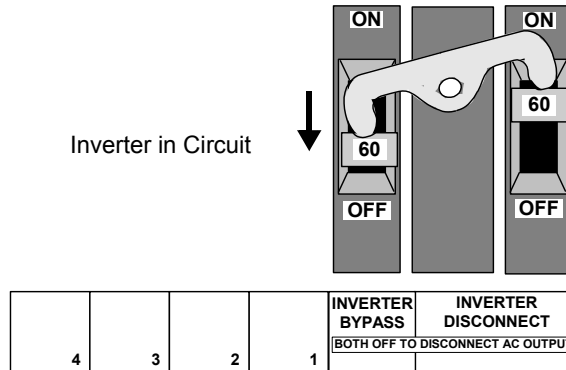


Figure 2-2 Normal Operation

Bypass Operation

External AC power routed directly to the AC loads (Figure 2-3).

In this configuration, power passes directly to the connected load, bypassing the inverter. This allows the inverter to be removed from service without affecting the connected load. If the external source of AC becomes unavailable while the Bypass Operation is selected, the load will be dropped.

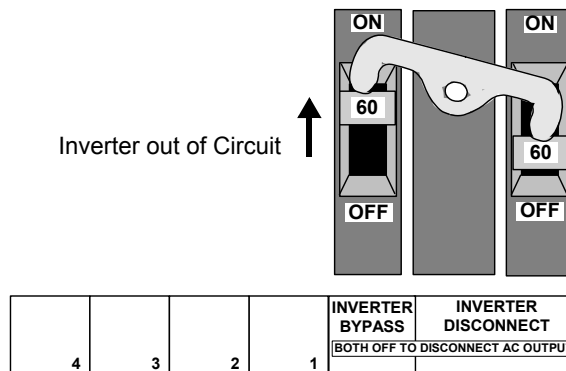


Figure 2-3 Bypass Operation

AC Input/Output Off

No power to the load or charger (Figure 2-4).

In this configuration, power from both the external sources of AC and the inverter is removed from the loads. This allows the inverter, the connected loads, or any other installed equipment beyond the ACCB to be serviced.

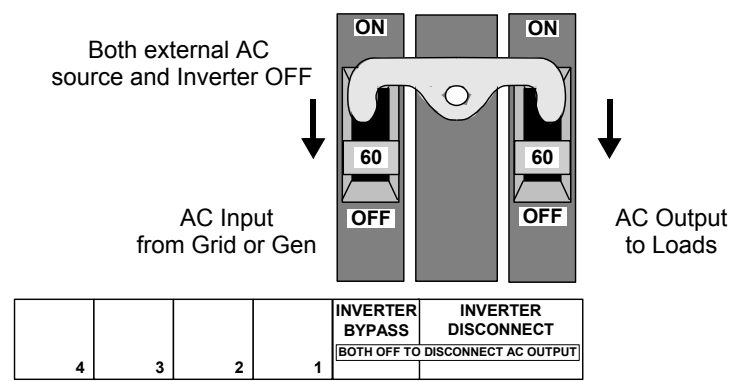


Figure 2-4 AC Output OFF

Dual Inverters: 240 Vac Loads



WARNING: Fire Hazard

In a series-stacked, inverter installation (120/240 Vac) with a bypass switch for each inverter, both bypass switches must be in the same position.

If the bypass switches are not in the same position, the resulting AC output of the two bypass switches may not be 180° out-of-phase from each other. This can result in excess current on the neutral wire creating a potential fire hazard.

This can also result in less than 240 Vac output. Loads requiring 240 Vac will not run.

Warranty and Product Information

Warranty

What does this warranty cover? This Limited Warranty is provided by Xantrex Technology, Inc. ("Xantrex") and covers defects in workmanship and materials in your **Sine Wave Plus AC Conduit Box**. This warranty lasts for a Warranty Period of **two (2) years** from the date of purchase at point of sale to you, the original end user customer.

This Limited Warranty is transferable to subsequent owners but only for the unexpired portion of the Warranty Period.

What will Xantrex do? Xantrex will, at its option, repair or replace the defective product free of charge, provided that you notify Xantrex of the product defect within the Warranty Period, and provided that Xantrex through inspection establishes the existence of such a defect and that it is covered by this Limited Warranty.

Xantrex will, at its option, use new and/or reconditioned parts in performing warranty repair and building replacement products. Xantrex reserves the right to use parts or products of original or improved design in the repair or replacement. If Xantrex repairs or replaces a product, its warranty continues for the remaining portion of the original Warranty Period or 90 days from the date of the return shipment to the customer, whichever is greater. All replaced products and all parts removed from repaired products become the property of Xantrex.

Xantrex covers both parts and labor necessary to repair the product, and return shipment to the customer via a Xantrex-selected non-expedited surface freight within the contiguous United States and Canada. Alaska and Hawaii are excluded. Contact Xantrex Customer Service for details on freight policy for return shipments outside of the contiguous United States and Canada.

How do you get service? If your product requires troubleshooting or warranty service, contact your merchant. If you are unable to contact your merchant, or the merchant is unable to provide service, contact Xantrex directly at:

Phone: 1-800-670-0707 (toll free)

1-360-435-8826 (direct)

Fax: 1-360-435-3547

Email: CustomerService@xantrex.com

Direct returns may be performed according to the Xantrex Return Material Authorization Policy described in your product manual. For some products, Xantrex maintains a network of regional Authorized Service Centers. Call Xantrex or check our website to see if your product can be repaired at one of these facilities.

In any warranty claim, dated proof of purchase must accompany the product and the product must not have been disassembled or modified without prior written authorization by Xantrex.

Warranty and Product Information

Proof of purchase may be in any one of the following forms:

- The dated purchase receipt from the original purchase of the product at point of sale to the end user, or
- The dated dealer invoice or purchase receipt showing original equipment manufacturer (OEM) status, or
- The dated invoice or purchase receipt showing the product exchanged under warranty

What does this warranty not cover? This Limited Warranty does not cover normal wear and tear of the product or costs related to the removal, installation, or troubleshooting of the customer's electrical systems. This warranty does not apply to and Xantrex will not be responsible for any defect in or damage to:

- a) the product if it has been misused, neglected, improperly installed, physically damaged or altered, either internally or externally, or damaged from improper use or use in an unsuitable environment;
- b) the product if it has been subjected to fire, water, generalized corrosion, biological infestations, or input voltage that creates operating conditions beyond the maximum or minimum limits listed in the Xantrex product specifications including high input voltage from generators and lightning strikes;
- c) the product if repairs have been done to it other than by Xantrex or its authorized service centers (hereafter "ASCs");
- d) the product if it is used as a component part of a product expressly warranted by another manufacturer;
- e) the product if its original identification (trade-mark, serial number) markings have been defaced, altered, or removed.

Disclaimer

Product

THIS LIMITED WARRANTY IS THE SOLE AND EXCLUSIVE WARRANTY PROVIDED BY XANTREX IN CONNECTION WITH YOUR XANTREX PRODUCT AND IS, WHERE PERMITTED BY LAW, IN LIEU OF ALL OTHER WARRANTIES, CONDITIONS, GUARANTEES, REPRESENTATIONS, OBLIGATIONS AND LIABILITIES, EXPRESS OR IMPLIED, STATUTORY OR OTHERWISE IN CONNECTION WITH THE PRODUCT, HOWEVER ARISING (WHETHER BY CONTRACT, TORT, NEGLIGENCE, PRINCIPLES OF MANUFACTURER'S LIABILITY, OPERATION OF LAW, CONDUCT, STATEMENT OR OTHERWISE), INCLUDING WITHOUT RESTRICTION ANY IMPLIED WARRANTY OR CONDITION OF QUALITY, MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE TO THE EXTENT REQUIRED UNDER APPLICABLE LAW TO APPLY TO THE PRODUCT SHALL BE LIMITED IN DURATION TO THE PERIOD STIPULATED UNDER THIS LIMITED WARRANTY.

IN NO EVENT WILL XANTREX BE LIABLE FOR ANY SPECIAL, DIRECT, INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES, LOSSES, COSTS OR EXPENSES HOWEVER ARISING WHETHER IN CONTRACT OR TORT INCLUDING WITHOUT RESTRICTION ANY ECONOMIC LOSSES OF ANY KIND, ANY LOSS OR DAMAGE TO PROPERTY, ANY PERSONAL INJURY, ANY DAMAGE OR INJURY ARISING FROM OR AS A RESULT OF MISUSE OR ABUSE, OR THE INCORRECT INSTALLATION, INTEGRATION OR OPERATION OF THE PRODUCT.

Exclusions

If this product is a consumer product, federal law does not allow an exclusion of implied warranties. To the extent you are entitled to implied warranties under federal law, to the extent permitted by applicable law they are limited to the duration of this Limited Warranty. Some states and provinces do not allow limitations or exclusions on implied warranties or on the duration of an implied warranty or on the limitation or exclusion of incidental or consequential damages, so the above limitation(s) or exclusion(s) may not apply to you. This Limited Warranty gives you specific legal rights. You may have other rights which may vary from state to state or province to province.

Warning: Limitations On Use

Please refer to your product manual for limitations on uses of the product.

SPECIFICALLY, PLEASE NOTE THAT THE **SINE WAVE PLUS AC CONDUIT BOX** SHOULD NOT BE USED IN CONNECTION WITH LIFE SUPPORT SYSTEMS OR OTHER MEDICAL EQUIPMENT OR DEVICES. WITHOUT LIMITING THE GENERALITY OF THE FOREGOING, XANTREX MAKES NO REPRESENTATIONS OR WARRANTIES REGARDING THE USE OF THE XANTREX **SINE WAVE PLUS AC CONDUIT BOX** IN CONNECTION WITH LIFE SUPPORT SYSTEMS OR OTHER MEDICAL EQUIPMENT OR DEVICES.

Please note that the **Sine Wave Plus AC Conduit Box** is not intended for use as an uninterruptible power supply and Xantrex makes no warranty or representation in connection with any use of the product for such purposes.

Return Material Authorization Policy

Before returning a product directly to Xantrex you must obtain a Return Material Authorization (RMA) number and the correct factory "Ship To" address. Products must also be shipped prepaid. Product shipments will be refused and returned at your expense if they are unauthorized, returned without an RMA number clearly marked on the outside of the shipping box, if they are shipped collect, or if they are shipped to the wrong location.

When you contact Xantrex to obtain service, please have your instruction manual ready for reference and be prepared to supply:

- The serial number of your product
- Information about the installation and use of the unit
- Information about the failure and/or reason for the return
- A copy of your dated proof of purchase

Record these details in on [page WA-4](#).

Return Procedure

1. Package the unit safely, preferably using the original box and packing materials. Please ensure that your product is shipped fully insured in the original packaging or equivalent. This warranty will not apply where the product is damaged due to improper packaging.
2. Include the following:
 - The RMA number supplied by Xantrex Technology, Inc. clearly marked on the outside of the box.
 - A return address where the unit can be shipped. Post office boxes are not acceptable.
 - A contact telephone number where you can be reached during work hours.
 - A brief description of the problem.
3. Ship the unit prepaid to the address provided by your Xantrex customer service representative.

If you are returning a product from outside of the USA or Canada In addition to the above, you MUST include return freight funds and are fully responsible for all documents, duties, tariffs, and deposits.

If you are returning a product to a Xantrex Authorized Service Center (ASC) A Xantrex return material authorization (RMA) number is not required. However, you must contact the ASC prior to returning the product or presenting the unit to verify any return procedures that may apply to that particular facility.

Out of Warranty Service

If the warranty period for your **Sine Wave Plus AC Conduit Box** has expired, if the unit was damaged by misuse or incorrect installation, if other conditions of the warranty have not been met, or if no dated proof of purchase is available, your inverter may be serviced or replaced for a flat fee.

To return your **Sine Wave Plus AC Conduit Box** for out of warranty service, contact Xantrex Customer Service for a Return Material Authorization (RMA) number and follow the other steps outlined in “[Return Procedure](#)” on page WA-3.

Payment options such as credit card or money order will be explained by the Customer Service Representative. In cases where the minimum flat fee does not apply, as with incomplete units or units with excessive damage, an additional fee will be charged. If applicable, you will be contacted by Customer Service once your unit has been received.

Information About Your System

As soon as you open your **Sine Wave Plus AC Conduit Box** package, record the following information and be sure to keep your proof of purchase.

- ☐ Purchased From _____
- ☐ Purchase Date _____

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Xantrex
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